



**University of
Sheffield**

**Exploring the Challenges and Opportunities Involved in Increasing
Physical Activity among Children and Young People in Saudi Arabian
Schools**

By: Abdullah Omar Y Alalawi

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Abstract

Background: The growing global burden of noncommunicable diseases, exacerbated by insufficient physical activity (PA), is a significant health issue in the Kingdom of Saudi Arabia (KSA). Cultural and environmental factors limit opportunities for PA, especially among school children in urban areas.

Aim: This study explores the challenges and opportunities for school-based PA to inform future interventions among schoolboys aged 13 to 15 years in KSA.

Methods: Systematic reviews assessed international and Arabic country-specific evidence for school-based PA interventions. Qualitative data were collected through semi-structured interviews with 16 school staff, seven parents and workshops with 37 students in two contrasting schools one private and one public sector in Jeddah City, KSA. Follow-up interviews were conducted with a total of nine school staff members at both schools.

Results: Review evidence identified promising interventions for increasing PA in schools including The Daily Mile, active breaks, active desks, and multi-component programmes. In Arabic countries, interventions focusing on PA, nutrition, and education showed potential to increase PA and decrease BMI. Primary research revealed that PA among adolescents is influenced by multiple factors. Individual-level motivators included enjoyment, competition, and health benefits, while barriers comprised academic pressures and sedentary preferences. Interpersonally, variable support from parents, friends, and teachers impacted PA levels. Organisationally, the school environment, facilities, and policies affected PA availability. Community-level insights indicated broader societal and policy interventions, including adapting international programmes to local contexts.

Conclusion: This study underscores the need for a multi-dimensional approach to enhance PA among adolescents in Jeddah. Stakeholders should pilot and adapt effective international PA interventions, address school resource disparities, increase PA time in the curriculum, and enhance parental awareness about PA's importance. These measures are crucial for creating an environment that supports PA to improve public health and enhance youth well-being in KSA.

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List of Abbreviations

ABs: Active Breaks
ACS: Active commuting school
BMI: Body Mass Index
CASP: Critical Appraisal Skills Programme
C-RCT: Cluster-randomised controlled trial
CRF: Cardiorespiratory fitness
CT: Controlled trial
GCC: Gulf Cooperation Council
GT: Grounded theory
HRQoL: Health-Related Quality of Life
IPA: Interpretive phenomenological analysis
JBI: Joanna Briggs Institute
KSA: Kingdom of Saudi Arabia
MVPA: Moderate-to-vigorous physical activity
NCDs: Noncommunicable diseases
PA: Physical activity
PE: Physical education
PF: Physical fitness
RCT: Randomised controlled trial
SCHARR: Sheffield Centre for Health and Related Research
SB: Sedentary behaviour
SEM: Social Ecological Model
TDM: The Daily Mile
TA: Thematic analysis
UAE: United Arab Emirates
US: United States
UK: United Kingdom
WC: Waist circumference
WHO: World Health Organisation

Authorship Statement

Chapter three of this thesis has been published in a peer-reviewed open-access journal (PLOS One). The reference of this paper can be found below along with the authors' contributions.

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Both papers were a collaborative effort with two co-authors: Lindsay Blank and Elizabeth Goyder. The lead author, Abdullah Alalawi, served as the corresponding author and was responsible for conceptualizing the idea, synthesising and analysing data from various sources, writing and reviewing the main manuscripts, and editing the papers. Lindsay Blank acted as the second reviewer for both papers. She independently conducted the screening of titles and abstracts, data extraction, and quality assessments. Any disagreement between the first two authors was resolved by discussion with the third reviewer Elizabeth Goyder. Furthermore, Goyder reviewed both papers during the writing and through submission to the journal.

Chapter One: Introduction

1.1 Overview

This chapter provides an introduction to the thesis and presents its structure.

1.2 Introduction

Noncommunicable diseases (NCDs) represent a growing global health crisis, with the highest concentrations observed in Arabic countries, including a notably high prevalence of diabetes (10.9%) and rapidly increasing obesity levels (Alasqah et al., 2021; Chaabane et al., 2020). This surge in NCDs, including heart disease, obesity, and diabetes, underscores the urgent need for effective preventive strategies across these nations (Kahan et al., 2015).

PA is universally acknowledged as a pivotal preventative measure against NCDs, providing a variety of health advantages, including lowering the likelihood of heart-related illnesses, improving muscular strength, balance, and enhancing heart and lung function (Lee et al., 2012; Chaddha et al., 2017). Its role in mitigating obesity, diabetes, high blood pressure, and managing conditions like hypertension and certain cancers is well-documented (Alahmed & Lobelo, 2019; Pinto et al., 2020; Sharara et al., 2018), making PA crucial for maintaining a healthy body weight, supporting mental health, and promoting general well-being (Alvarez-Pitti et al., 2020).

The significance of PA extends into childhood and adolescence, critical periods for establishing healthy habits. During these stages, engaging in sufficient PA is crucial for preventing overweight and obesity by contributing to stronger muscles and bones, improving cardiovascular fitness, and aiding in the management of depression and anxiety (Alasqah et al., 2021). Yet, in developed countries and particularly within Arabic nations, PA levels in children and adolescents are still below recommended thresholds, exacerbating

the risk of energy imbalance, obesity, and associated health complications (Bull et al., 2020).

Given this backdrop, this thesis focuses on a crucial public health intervention strategy: implementing PA within the school setting in the KSA as a means to tackle the escalating prevalence of NCDs. This approach is grounded in the understanding that schools represent a pivotal arena for instilling and nurturing healthy PA habits among children and adolescents (Lissau, 2007), which has the potential to reverse the trends of inactivity and associated NCDs prevalent in the region.

1.3 Thesis Structure

1.3.1 Chapter One: Introduction

1.3.2 Chapter Two: Background

This chapter is comprised of five main sections. It begins with an introduction to the general benefits of PA and the consequences of physical inactivity, including obesity and chronic conditions. The chapter then highlights the benefits of PA among children, both mentally and physically, and discusses PA as a public health intervention. This includes a detailed description of the types of school-based PA interventions that have been implemented internationally. Following this, there is an overview of current public health priorities and current school PA provisions in the KSA, to establish the rationale behind the research. At the end of this chapter, the research aim and objectives are presented, along with the theoretical framework for this thesis.

1.3.3 Chapter Three: Umbrella Systematic Review of International Evidence for the Effectiveness of School-based PA Interventions

This chapter presents a systematic review of reviews, aiming to evaluate the existing literature on the effectiveness of school-based PA interventions. Its purpose is to identify the most effective interventions for promoting PA among schoolchildren aged six to 18 years at an international level.

1.3.4 Chapter Four: Systematic Review of Evidence for the Effectiveness of School-based PA Interventions in the Middle East and Arabic-speaking Countries

This chapter presents a systematic review of primary studies focusing on school-based interventions for promoting PA among children and young people aged six to 18 years in Middle Eastern and Arabic-speaking countries. Its purpose is to identify the most effective interventions for promoting PA among schoolchildren aged six to 18 years in these specific countries.

1.3.5 Chapter Five: Exploring PA Promotion in the School Setting: Methods

This chapter describes the methods of the qualitative study, and it begins with an overview of the research methodology, followed by the philosophical paradigm that guides this research and a detailed rationale for the selection of specific methods. The chapter then presents the research design, highlighting the qualitative methods employed and discussing various elements integral to this approach. Additionally, data collection methods, including semi-structured interviews and workshops, are thoroughly described. This includes an outline of the criteria for participant selection, the purposive sampling technique used, and the ethical considerations adhered to, along with the translation process for data. The chapter proceeds to detail the data analysis procedures and addressing the reliability, credibility, and dependability of the qualitative research data. Finally, it provides an

explanation of the engagement in public involvement prior to the commencement of the main study.

1.3.6 Chapter Six: Exploring PA Promotion in the School Setting: Results

This chapter presents the qualitative findings from two primary research data-gathering methods: semi-structured interviews with school staff members and parents, and workshops conducted with children. All results are organised into themes and sub-themes, which are arranged according to the social-ecological model (SEM).

1.3.7 Chapter Seventh: Follow-up Interviews

This chapter provides the rationale for conducting follow-up interviews, details the interview recruitment, data collection and analysis methods and findings.

1.3.8 Chapter Eight: Discussion, Conclusion and Recommendations

This chapter aims to contextualize the research findings within the broader literature, examining the key findings of the research and exploring their alignment or divergence from previous studies. It also evaluates the strengths and limitations of the research and presents recommendations for both policymakers and schools.

Chapter Two: Background

2.1 Introduction

This chapter introduces the general benefits of PA and the consequences of physical inactivity, including obesity and chronic conditions. It highlights how PA benefits children's mental and physical health and its utility as a public health intervention. This includes a detailed description of the types of school-based PA interventions that have been implemented internationally. Following this, there is an overview of the KSA including current public health priorities and current school PA provisions in the KSA to establish the rationale for the research. The chapter concludes by presenting the research aims and objectives along with the theoretical framework.

2.2 The General Benefits of PA and Consequences of Physical Inactivity

PA is defined as any bodily movement produced by skeletal muscle contraction that leads to a higher energy expenditure than the resting metabolic rate (Caspersen et al., 1985). PA varies in intensity from vigorous (both hard and very hard), moderate, light, to very light levels (Grüne et al., 2020). Engaging in regular or daily PA is vital for the physical, mental, and overall well-being of individuals of all ages, including children, adolescents, and adults. Moderate levels of PA contribute to numerous health advantages for the body, heart, and mind, enhancing mental, physical, and social functions across all age groups (Lee et al., 2012; WHO, 2018). Furthermore, it can boost mood, self-esteem, energy levels, and sleep quality, while diminishing stress, depression, and anxiety. The World Health Organisation (WHO) suggests that adults should engage in at least 150 minutes of moderate-intensity aerobic PA weekly, or at least 75 minutes of vigorous-intensity activity, to obtain these health benefits (WHO, 2018).

On the other hand, a lack of PA is a major risk factor for obesity, being overweight, NCDs, and other chronic health issues. It negatively impacts the health of children and adolescents,

placing a strain on families, communities, healthcare systems, and governments. Globally, insufficient PA is the fourth leading cause of early death, accounting for 6% of all mortalities (WHO, 2018). Notably, the Arabic region reports the highest global rates of chronic diseases such as obesity and diabetes, with more than 26% of the population currently diagnosed with diabetes. This figure is expected to rise to over one-quarter of young adults by 2050 (Meo et al., 2017).

Obesity, a severe global issue, is marked by abnormal or excessive accumulation of fat in adipose tissue, where one's body fat exceeds 20% of the ideal body weight as recommended by the WHO (Mechanick et al., 2018). Chichester et al. (2021) describes ideal body weight as a balance among bones, fats, muscles, and body water. Maintaining an ideal weight is influenced by good eating habits, environmental conditions, regular PA, and genetic factors.

Managing obesity in childhood and adolescence is essential, as research indicates that many obese adolescents continue to be obese as adults (WHO 2016; Sahoo et al., 2015). The WHO has described obesity as a global epidemic, with developing countries exhibiting very high rates of obesity among adults and adolescents alike (Ellulu et al., 2014). Despite public awareness campaigns, obesity-related diseases are continuously and rapidly increasing (Walls et al., 2011). This growing problem in developing countries has led researchers like Farrag et al. (2017) to call for increased research and funding to better understand and address childhood obesity.

Psychological issues associated with obesity include low self-esteem and anxiety, as well as more severe disorders like depression and eating disorders such as anorexia, bulimia, and binge-eating (Moradi et al., 2020). These problems, particularly prevalent among teenagers, are often attributed to a cultural perspective that values slimness, resulting in stigmatization of obese individuals. While females mainly face this issue, males also suffer from obesity-

related psychological problems, using eating as a source of emotional comfort, which can lead to weight gain, obesity, and further low self-esteem (Hammad & Berry, 2017). This creates a vicious cycle exacerbating the issue. Obese individuals also tend to have less energy and lower levels of life enjoyment than their non-obese counterparts, often leading to a sedentary lifestyle which only perpetuates the cycle of obesity and inactivity (James, 2018; Mechanick et al., 2018).

2.3 Benefits of PA among Children – Mental and Physical

PA offers numerous health benefits for children, both physically and mentally. For example, regular PA contributes to develop the fundamental motor skills and the building of healthy bones, hearts, lungs, and muscles (Andermo et al., 2020). It also plays a crucial role in brain development and supports essential functions that ensure proper mental health and healthy growth (Andermo et al., 2020). Children who lead an active lifestyle exhibit better overall health, cardiorespiratory fitness (CRF), and body composition (Gunter et al., 2015). Furthermore, children and youth who participate in higher levels of PA and spend fewer hours in sedentary activities are associated with a higher health-related quality of life, as found in a recent review by Wu et al. (2017). Conversely, adolescents who exhibit higher levels of sedentary behaviour (SB) and inactivity are more likely to develop metabolic syndrome in adulthood, along with risks of overweight/obesity and highly clustered cardiometabolic risk factors (Neto et al., 2011). For example, a longitudinal study has shown that children and youth who are highly active in childhood are likely to maintain an active lifestyle into adulthood (Telama et al., 2005). Consequently, to promote their health, the WHO suggests that children and young people aged 5 to 17 years should engage in at least one hour of Moderate-to-vigorous physical activity (MVPA) daily (WHO, 2020; Bull et al., 2020).

2.4 PA as a Public Health Intervention

PA interventions and the promotion of healthy lifestyle practices are most effectively implemented in educational settings, as children spend a significant portion of their daytime hours in schools (Lynch & Soukup, 2016). The school environment is still regarded as a crucial place for providing quality physical education (PE) and numerous opportunities for PA to increase participation, well-being, and a healthy lifestyle (WHO, 2017). Additionally, the environment provided by schools may offer a unique opportunity to influence children's health behaviours positively. According to a systematic review by Rasberry et al. (2011), engaging in PA within school settings not only enhances students' academic performance but also improves their attention, reduces stress, and anxiety. Moreover, students who regularly participate in physical activities tend to achieve higher grades. This correlation can be attributed to several factors, including the increase in blood flow and hormone release facilitated by regular PA, which, in turn, improves concentration, memory, and mood, while simultaneously reducing stress and anxiety (Al-Hazzaa, 2014).

2.4.1 Global School-Based PA Interventions

Numerous global school-based PA interventions have been developed and implemented across different countries to promote PA within school settings. Countries such as the United States (US), Australia, Canada, New Zealand, and the United Kingdom (UK) have launched national PA initiatives (Naylor et al., 2015; Cassar et al., 2019). The "WHO Global Action Plan" for Noncommunicable Disease Prevention and Control aims to reduce physical inactivity by 10% by 2025 and by an additional 5% by 2030 (WHO, 2018). This ambitious goal necessitates concerted efforts from academics, scientists, policymakers, and practitioners worldwide (Bull, 2018). It is important to note, however, that despite the existence of national PA initiatives in these countries, the manner in which institutions

implement them varies. In some instances, implementation is not mandatory, while in others, institutions may adapt the programmes to better suit their populations.

For instance, in the U.S., **the 100 Mile Club programme** as described by Wright et al. (2019), encourages students to walk or run at least 100 miles per year during term time. Schools, led by administrators and/or PE teachers, are advised by the U.S. government to offer this programme for at least 30 minutes per week, ensuring students meet the 100-mile annual goal. Additionally, the U.S. hosts the CHALK/Just Move programme, which integrates structured classroom-based PA breaks with both low- and high-intensity movements, such as yoga poses, squats, and jumping jacks. This approach aims to meet children's PA requirements while they learn. Wright et al. (2019) found that in participating schools, the 100 Mile Club programme achieved 43% in terms of the number of children meeting the goal of running or walking 100 miles.

Another example is **The Daily Mile (TDM)**, initiated in Scotland and described by Chesham et al. (2018) as a programme aimed at improving child health. It involves schoolchildren running or walking for 15 minutes every day at school. TDM's adoption across the UK and Europe, as reported by Chesham et al. (2018) and Brustio et al. (2018), highlights its broad acceptability, effectiveness, feasibility and the perceived need for accessible health initiatives for children. The programme has been implemented in over 15,600 schools and other settings worldwide over the past decade (Breslin et al., 2023).

Active breaks (ABs) were described by Masini et al. (2020) as designed to integrate short, engaging physical activities into the school day, breaking up long periods of sedentary classroom time. This intervention aims to enhance students' physical health, cognitive function, and academic performance by providing them with opportunities to move and exercise between lessons. Classroom-based PA interventions, involving brief ABs and lessons that incorporate PA along with academic material (physically active lessons), have

been explored as effective methods to enhance PA during school hours without reducing time allocated for education (Masini et al., 2020; Calella et al., 2020). This intervention has been evaluated and the efficacy has been reviewed and demonstrated a positive effect when it was objectively measured in increasing PA among children in primary schools (Masini et al., 2020).

Active School Transport (AST) was described by Larouche et al. (2018) as a strategy designed to encourage school-aged children, to engage in PA through their mode of transportation to and from school. These interventions promote walking, cycling, or using any form of non-motorized transport, with the aim of increasing daily PA levels and enhancing physical health. By integrating PA into daily routines, AST contributes to improving cardiovascular health and fitness. Schools or councils/local authorities/government often support these initiatives by improving infrastructure, such as adding bike lanes and safe pedestrian paths and organising walking groups or bike-to-school days to motivate participation. There is evidence indicating that children and adolescents who participate in AST, such as walking or cycling, tend to be more physically active compared to their peers who commute via motorized transport (Larouche et al., 2014; Schoeppe et al., 2013).

The standing desk programme (Guirado et al., 2021) in a school setting is designed to transform traditional classroom environments into more active and flexible ones. This programme typically involves a phased rollout of standing desks, starting with pilot classrooms to gauge effectiveness and student reception before a wider implementation. Educators receive training on how to integrate these desks into daily teaching practices, ensuring that the transition supports educational outcomes. The programme may also include adjustable or convertible desks to accommodate various activities and individual student preferences (Sherry et al., 2020; Parrish et al., 2018).

Educational programmes were described by Moeini et al. (2021), these interventions were based on health education theories and aimed at changing adolescents' behaviours through increased knowledge and awareness. Educational sessions addressed topics like the significance of PA for weight management and strategies to incorporate more activity into daily life. Additionally, **multi-component interventions** were combined various elements, such as PE classes, health education, family involvement, and technology support. These programmes aimed to tackle multiple aspects influencing adolescents' PA levels and dietary habits simultaneously.

2.4.2 Overview of Effectiveness of School-Based Interventions

A previous umbrella systematic review conducted by Mannocci et al. (2020) synthesised evidence on interventions to increase PA among children and young people across various settings, with a significant focus on school-based programmes. It found that interventions involving PA embedded within the school curriculum, long-term initiatives, teacher involvement, and family support show the most promise in enhancing PA levels. The review includes studies conducted in school, preschool, family, and community settings, highlighting the comprehensive scope of its analysis and the pivotal role of schools in promoting PA. Furthermore, Barbosa Filho et al. (2016) conducted an extensive umbrella systematic review targeting low and middle-income countries. They examined fifty reviews and twenty-five studies to gather evidence on the effectiveness of PA interventions for children and adolescents aged 6 to 18 years. This review confirmed that PA interventions are beneficial in promoting PA behaviours within this demographic, and it found compelling evidence that school-based PA interventions have a positive effect on young people's PA levels. These outcomes align with findings from other international reviews (Pearson et al., 2015; Verstraeten et al., 2012; Biddle et al., 2014; Hoehner et al., 2013; De Bourdeaudhuij et al., 2011; Ribeiro et al., 2010). Nonetheless, these reviews were based on a search for studies published prior to November 2017, therefore, there is a need to update

and provide a comprehensive overview of the latest studies on the effectiveness of school-based interventions to promote PA among school-aged children internationally.

2.5 Overview of Current Public Health Priorities in KSA

KSA, characterised by its unique geographical and climatic conditions, faces significant public health challenges, particularly in the field of NCDs. The kingdom is known for its hot and dry climate, with extreme temperatures for much of the year, inherently limiting outdoor physical activities (Sulthan, 2016). This environmental factor, combined with cultural practices, contributes to sedentary lifestyles, making physical inactivity a prevalent issue (Al-Hazzaa & AlMarzooqi, 2018). Therefore, this thesis recognises climatic conditions in the area as a potential factor contributing to inactivity, underscoring the need to consider these conditions when developing practical interventions.

The current public health priorities in the KSA underscore the urgent need to address the high prevalence of chronic diseases, such as diabetes, cardiovascular diseases and obesity, which are relatively linked to physical inactivity. Despite the recognised importance of regular PA and its wider benefits, there remains a notable gap in the provision of adequate facilities and programmes within the educational system, especially in schools. This gap is particularly concerning given the rising trend of SB among school-aged children, a critical period for establishing lifelong health habits. Al-Hazzaa & AlMarzooqi (2018) indicated that The Ministry of Education in KSA has established several programmes in an attempt to promote PA participation in boys' schools, such as health-promoting schools and health-enhancing PA programmes. However, these initiatives were often fragmented and implemented on a short-term basis as stated by (Al-Hazzaa & AlMarzooqi, 2018). Moreover, there has been a lack of formal evaluations and assessments to determine the effectiveness and feasibility of these programmes. It is also important to note that, historically, PE classes were absent from the curriculum for girls at all educational levels,

and PA was not permitted in girls' schools until 2018. In a significant shift, the Ministry of Education introduced PE programmes for girls, enabling schools for girls to offer PA classes starting from the year 2018 (Al-Hazaa & AlMarzooqi, 2018).

Despite the clear benefits of PA, schoolchildren encounter numerous barriers to engaging in effective and adequate PA. Challenges such as the pressure of examinations, overcrowded curriculums, and limited resources can significantly hinder the integration of PA into daily routines (Aljuhani & Sandercock, 2019). In KSA, the situation is exacerbated by the limited allocation of time for PE. Primary school children typically receive only two PE sessions per week, with most sessions lasting just 90 minutes, and intermediate schools have one session of 45 minutes, while high schools also have two sessions (Albugami, 2018; Alnahdi, 2014). The scarcity of adequate facilities and the insufficient time dedicated to PA within the school curriculum further compound these challenges (Albugami, 2018).

Aljuhani & Sandercock (2019) carried out a study to examine the contribution of PE to the daily PA of school-aged children in the KSA. Their findings highlight a critical gap in the school curriculum: a lack of comprehensive PE, which leads to students' inadequate understanding of the importance of PA for promoting physical fitness (PF). Therefore, they suggested that PE classes should be conducted on all school days. Furthermore, it is imperative to advocate for policy changes that prioritise PA in schools, ensuring that PE is recognised as an essential component of students' overall education (Aljuhani & Sandercock, 2019).

By reimagining the approach to PA in schools, it can significantly enhance the physical and mental well-being of children, laying the foundation for healthier, more active lifestyles that extend beyond the school years into adulthood. The promotion of PA as a public health intervention in schools not only has the potential to improve academic performance and

personal development but also addresses critical public health challenges by combating sedentary lifestyles and preventing chronic diseases from an early age (Solberg et al., 2021).

2.5.1 PA in KSA and Issues Resulting from Low PA

Over recent decades, KSA has undergone significant economic development, lifestyle shifts, demographic changes, and extensive urbanisation. These transformations have led to increased physical inactivity and SB in Saudi society, prompting major changes in lifestyle habits (Bcheraoui et al., 2015). As a result, the prevalence of lifestyle related NCDs such as diabetes, obesity, hypertension, and coronary artery diseases has risen in the KSA (Almahmeed et al., 2012). Despite substantial evidence highlighting the benefits of PA in preventing chronic NCDs, a high level of inactivity persists among Saudi citizens. A national survey by Alqahtani et al. (2021), including 13 regions and 26,000 families in KSA, revealed that 82.6% of individuals aged 15 years and younger were not engaging in adequate PA (i.e., ≥ 150 min per week). Additionally, an observational study by Amin et al. (2021) found that 80% of a sample of 2,176 Saudis did not meet the recommended levels of PA, despite recognising its link to chronic diseases. Furthermore, The Saudi Health Interview Survey, which included 10,735 respondents, revealed that 46.5% of the participants engaged in no regular PA whatsoever, and half of them spent more than 3 hours a day watching television (Daoud et al., 2016). As a result, active males demonstrated a lower risk of obesity compared to their inactive counterparts (Memish et al., 2014). Another national survey, involving 4,883 individuals, indicated high levels of inactivity, with participants spending an average of 4.5 hours per day in sedentary activities. Moreover, 60% of male and 73% of female participants did not meet the criteria for a moderate level of PA (Salem et al., 2022). Al-Hazzaa (2004) further noted a particularly high prevalence of inactivity among children (57%) and youth (71%) in KSA, prompting Al-Hazzaa et al. (2018) to declare physical inactivity a significant public health issue in the country.

Historically, the physical demands of daily life and work in KSA were enough to maintain lean body mass and a healthy level of fitness. However, the past two to three decades have seen rapid advancements in living standards and increased mechanization, affecting nearly all aspects of life in KSA. This era marked a notable shift towards reduced PA and more sedentary lifestyles among the Saudi population (Al-Agha et al., 2016). Coupled with massive urbanization and a growing reliance on computer and telecommunication technologies, a further decline in PA is anticipated (Almahmeed et al., 2012; Rahim et al., 2014).

These lifestyle changes, common across KSA and much of the Gulf Cooperation Council (GCC), have profound impacts on societal health. At the turn of the century, the WHO linked these lifestyle shifts to an epidemic of NCDs and various complications within the GCC (WHO, 2003). In recent years, WHO has identified insufficient PA as a significant global health threat, proposing objectives and priority actions to encourage physical exercise among the general population. One of WHO's recommendations includes the critical evaluation of PA levels across different population segments.

2.5.2 Obesity in KSA: A Growing Concern across All Ages

Obesity remains a significant health concern in KSA, affecting individuals across all age groups. Recent studies indicate that as of 2022, approximately 35% of the Saudi population is considered obese and nearly 70% overweight (Salem et al., 2022; Althumiri et al., 2021), showing a slight improvement but still highlighting the need for effective public health initiatives. The WHO in 2021 ranked KSA 35th globally in obesity rates, underscoring the ongoing challenge (WHO, 2021). Additionally, Alluhidan et al. (2022) emphasizes that obesity is still one of the leading causes of preventable deaths in the country, further stressing the critical importance of addressing this issue through comprehensive health policies and programmes.

This alarming trend is often attributed to the nation's rapid economic advancement, which has fostered more sedentary lifestyles. Many young people pursue higher education or engaging in schools and universities that involve prolonged periods of sitting with minimal PA. The widespread use of social media, smart mobile devices, and the internet has further exacerbated this trend, leading to decreased PA levels among citizens (AlMarzooqi, 2021).

The prevalence of obesity and overweight conditions among children and adolescents in KSA has been particularly concerning. A recent study highlighted that the overall prevalence of overweight and obesity among Saudi children and adolescents is concerning, with rates as high as 35.6% for boys and 19.2% for girls (Aljassim & Jradi, 2021). These figures underscore the need for effective public health interventions to address this growing problem.

For instance, in the western part of the country, Alqarni (2016) found that 29.8% of children are overweight. Among these, 7.9% are categorised as severely obese and 10.7% are considered obese. The prevalence varies significantly by location and gender; in the Qassim region, the obesity rates are 21.8 % for boys and 13.4 % for girls, while 55.9 % of boys and 33% of girls are overweight.

In urban areas like Riyadh and Jeddah, the statistics reveal similar concerns. Al Shehri et al. (2013) found that 8.7% of children aged 6-17 in Riyadh were obese, with 10.5% overweight. A study among adolescents aged 13-18 in Jeddah found that 44.8% were overweight. These figures are indicative of a broader trend affecting Saudi youth, with obesity rates at Prince Sultan University in Riyadh reported at 24%, surpassing the 17% observed in American students of the same age group (Brehim et al., 2014).

The rise in obesity rates among children is closely linked to decreased PA levels and lifestyle changes. Zick et al. (2007) note that an increase in physical inactivity during

childhood significantly impacts public health, often transitioning into reduced PA in adulthood. Early intervention is crucial, as reducing childhood obesity may diminish the risk of adult obesity (Al-Hazzaa et al., 2012) and lower the potential for mental health issues such as anxiety, depression, and low self-esteem (Todd et al., 2015). Early high BMI values are predictive of high BMI in later life, underscoring the likelihood of childhood obesity persisting into adulthood (Deshmukh-Taskar et al., 2006).

2.6 The Rationale for the Research

When comparing efforts in KSA with those in other parts of the world, it becomes evident that PA intervention programmes have been extensively studied in various countries and evaluated, as detailed in the preceding literature, but not as thoroughly in KSA, particularly among school-aged children. The scant research focusing on this demographic suggests that investigations into this subject within KSA are still emerging. To date, there has been no study conducted to explore the challenges and opportunities for school PA among Saudi Arabian schoolchildren to ensure their participation in at least moderate PA.

Children and young people in school account for a significant portion of the population in the Middle East and Arabic-speaking countries, with over one-third of the population being under the age of 15 (Hwalla et al., 2017). They spend about 40% of their waking hours in school, amounting to nearly 200 days a year. Given these statistics, schools appear to be ideal settings for encouraging PA and promoting health (Trudeau et al., 1999; Ridgers et al., 2006). Considering that this group is easily accessible in large groups and for considerable periods during the day at school, PA interventions can potentially provide a scientifically validated way of reducing or preventing the burden of chronic diseases in Arabic countries, particularly KSA (Benajiba et al., 2020). Moreover, the findings of this study are expected to contribute evidence-based recommendations to increase PA levels

among schoolboys in Jeddah City, KSA. These recommendations will be instrumental in designing more effective, feasible, and acceptable PA interventions in KSA schools.

2.7 Research Aim and Objectives

The overall aim of this research is to explore the challenges and opportunities for school PA which aim to increase PA levels among schoolboys aged 13 to 15 years in Jeddah City, KSA. To achieve the above aim, three studies were conducted as follows:

- **Study One:** a systematic review of reviews to evaluate the existing literature on the effectiveness of school-based PA interventions in order to determine the most effective interventions for promoting PA among schoolchildren aged between six and 18 years internationally (see Chapter Three).

- **Study Two:** a systematic review (see Chapter Four) that answers the following questions:

1. What is the effectiveness, feasibility and acceptability of school-based interventions in increasing PA among children and young people aged six to 18 years in Middle Eastern and Arabic-speaking countries?
2. What are the key components required in a school-based intervention programme to increase PA among this target population?
3. Are there particular combinations or components of school-based programmes that are more effective than others in increasing PA among this target population?

- **Study Three:** primary research to explore with stakeholders the challenges and opportunities for school PA and recommend the development of future interventions among schoolboys aged 13 to 15 years old from Jeddah City, KSA.

The third study was guided by the following objectives:

- I. To explore the perspectives of school staff and parents on the barriers to and enablers of school-based PA among male students aged 13 to 15 years in Jeddah City.
- II. To explore the perspectives of school male students aged between 13 to 15 years in Jeddah City and to generate participant-recommended strategies for increasing PA.
- III. To explore the factors that might influence the implementation of interventions aimed at increasing PA in KSA schools.

2.8 The Rationale for Researching the Specific Age of Group of 13 to 15 Years

The PE curriculum in KSA varies significantly across different educational stages, highlighting a potential area for in-depth research, especially at the intermediate school level. Primary school children typically benefit from two PE sessions per week, each lasting about 45 minutes. In contrast, students in intermediate schools are only allocated one 45-minute session per week (Albugami, 2018; Alnahdi, 2014). High schools return to the more frequent schedule of two sessions per week.

The ages of 13 to 15 years represent a critical developmental window where adolescents experience rapid physical growth and significant cognitive and emotional changes. Adolescence is recognised as a crucial developmental stage characterized by profound physical, cognitive, social, and emotional changes (Sawyer et al., 2018). Understanding the barriers and facilitators to PA during this period is essential for promoting healthy behaviours and addressing potential challenges (Janssen & LeBlanc, 2010).

Male students in this age group are typically enrolled in secondary school, where PA patterns may be influenced by school policies, curriculum requirements, and peer interactions (Owen et al., 2014). Exploring their experiences within the school context can provide valuable insights into factors that affect PA levels (Sallis et al., 2000). Furthermore,

exploring the barriers and facilitators to PA during this transition period can inform targeted interventions to promote lifelong participation in healthy behaviours (Bélanger et al., 2015).

Therefore, the specific focus on intermediate schoolboys in the context of KSA among adolescent boys in a particular cultural, social, and environmental context helps to address a significant gap in the existing literature and can help to tailor interventions and policies to address the unique needs and challenges faced by this population. (Al-Hazzaa et al., 2014).

2.9 Theoretical Framework (The SEM)

Engaging in PA presents a complex challenge, as the behaviours associated with exercise are influenced by a wide range of factors, each affecting behaviour to different extents (Zhang et al., 2015). The interplay of individual and societal environmental elements plays a crucial role in modifying behaviour. To address this complexity, the framework proposed by McLeroy et al. (1988) has been instrumental in examining the various aspects that influence PA engagement and adherence among young people and adolescents (Zhang et al., 2013). The Social-Ecological Model (SEM) asserts that PA behavior is shaped by five distinct levels or types of influences: (1) personal characteristics intrinsic to the individual; (2) interpersonal relationships and interactions; (3) organisational attributes; (4) community factors; and (5) public policies. McLeroy et al. (1988) aimed to delineate how these various levels influence health behaviours. They described potential intervention strategies at each level, as shown in Figure 2.1 below, and recommended that interventions could be classified as follows:

- **Intrapersonal Level:** These strategies aim to alter a person's knowledge, attitudes, behaviours, abilities, and self-perception.

- **Interpersonal Level:** These interventions focus on formal and informal social networks and support systems, including families, workplace groups, and social circles.
- **Organisational Level:** At this level, interventions identify factors linked to educational institutions, workplaces, or schools and may include impacts from educators and school leaders.
- **Community Level:** Here, interventions aim to alter the environment of the community or services and the interactions among different organisations within the community.
- **Public Policy Level:** At this level, interventions focus on creating or modifying public policies, including those at the local, state, and national levels, which can impact PA behaviours.

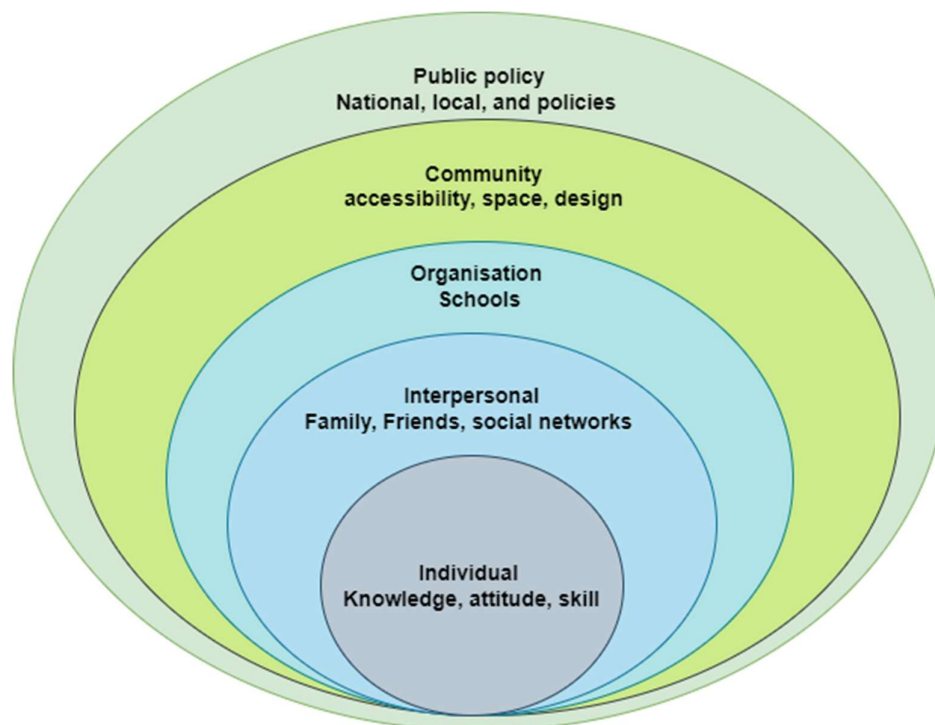


Figure 2.1: The SEM adapted from McLeroy et al. 1988

This model clarifies that an individual is part of a broader social framework, and the interaction between the individual and their environment is crucial for health outcomes (Sallis et al., 2001). The SEM is predicated on the understanding that the interplay among various elements, including personal characteristics, social influences, and environmental factors, offers a comprehensive explanation for engagement in PA (Glanz et al., 2015). Given that PA takes place in specific settings that can affect an individual's participation decision, the SEM is particularly well-suited for examining PA. Applying the SEM to enhance PA engagement involves analysing intrapersonal factors such as gender, age, and self-perception, as well as social-environmental factors like the influence of parents, teachers, and peers, in addition to physical environmental factors including safety, facility availability, and space access. These elements together influence an individual's decision to participate in PA at a suitable level (Bissell et al., 2018).

Numerous reviews and studies in the broader literature have investigated the determinants affecting sports or PA involvement among young people and adolescents (Quarmby et al., 2017; Rhodes et al., 2017; Hesketh et al., 2017; Kelly et al., 2017; Martins et al., 2017; Puggina et al., 2018; May et al., 2020). However, while these prior investigations have explored various factors influencing young individuals' participation in PA, none have conducted a comprehensive analysis that considers all five levels. While different models have their own limitations, the model by McLeroy and colleagues (1988) stands out due to its explicit differentiation between influences at the institutional and community levels. In research and interventions related to PA for children and young people, the focus is often on school-based exercises PA. Hence, this model was deemed appropriate and relevant for this research because all themes in Chapters Six and Seven were derived directly from the data and then categorised according to the SEM based on the themes' nature. This approach was adopted to facilitate the comparison of our findings with previous studies in this area.

2.10 Chapter Summary

This chapter has highlighted the significant role of PA in addressing public health concerns, particularly among children and adolescents in educational settings. It has established the importance of PA in improving both mental and physical health outcomes and demonstrated the effectiveness of some school-based interventions internationally. Focusing on KSA, the chapter underlines the pressing need for PA interventions, given the high rates of physical inactivity and related chronic conditions prevalent in the region.

Given the unique challenges in KSA, including climatic, cultural, and infrastructural factors, this research aims to tailor and recommend the implementation of effective PA strategies within KSA schools. By exploring the challenges and opportunities in the local context, the study seeks to provide evidence on opportunities to enhance the health and well-being of Saudi youth, supporting the broader public health objectives and filling critical gaps in the current educational system.

The following chapter will present a systematic review of reviews of previous studies, concentrating on school-based PA interventions aimed at increasing PA among schoolchildren aged six to 18 years globally.

Chapter Three: Umbrella Systematic Review of International Evidence for the Effectiveness of School-based PA Interventions

3.1 Introduction

A previous umbrella systematic review conducted by Mannocci et al. (2020) synthesised evidence on interventions to increase PA among children and young people across various settings, including school-based programmes. It found that interventions involving PA embedded within the school curriculum, long-term initiatives, initiatives with teacher involvement, and family support show the most promise in enhancing PA levels. The review includes studies conducted in school, preschool, family, and community settings, highlighting the comprehensive scope of its analysis and the pivotal role of schools in promoting PA. This review was based on a search for reviews published from January 2010 until November 2017 and a substantial body of further research on the effectiveness of school-based programmes has been published and synthesised since then. Therefore, this umbrella systematic review aims to update and provide a comprehensive overview of the latest studies on the effectiveness of school-based interventions to promote PA among school-aged children internationally.

3.2 Study Aim

The aim of this umbrella systematic review was to evaluate the existing literature on the effectiveness of school-based PA interventions in order to determine the most effective interventions for promoting PA among schoolchildren aged between six and 18 years around the world.

3.3 Methods

A comprehensive review of reviews was conducted, combining a literature search and narrative synthesis to assess evidence from intervention studies in school settings worldwide. This umbrella review adhered to PRISMA guidelines for conducting systematic

reviews. The protocol was registered in the PROSPERO International Prospective Register of Systematic Reviews (registration number: CRD42023494953).

3.3.1 Formulation of Research Question

The PICO framework was considered to formulate the aim of this research by describing the population (P), intervention (I), comparison (C) and outcome (O), as summarised in Table 3.1 below. The value of the PICO framework is that it breaks down complex questions into simpler phrases that also form the inclusion and exclusion criteria (Fenton & Baxter, 2016).

Table 3.1: PICO Framework

Population	School children and young people aged 6–18 years.
Intervention	School-based PA as either a primary intervention or a component of a multi behavioural intervention
Comparison	No intervention or usual school provision of PA, comparison of two or more interventions.
Outcome	Primary outcome: self-reported or objectively measured change in PA levels. Secondary outcome: Objectively measured BMI.

3.3.2 Inclusion and Exclusion Criteria

While a large body of evidence provides extensive material for decision-making, the sheer volume and diversity of research on school-based PA interventions globally can be overwhelming. To effectively manage and synthesis this extensive data, an umbrella review was chosen. This approach allows for a comprehensive analysis of existing systematic reviews that include primary studies evaluating the effectiveness of school-based PA interventions. Therefore, the following inclusion and exclusion criteria were applied to select the most appropriate articles for inclusion in this umbrella review.

Table 3.2: Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Systematic reviews and meta-analyses that incorporated various study designs, including randomised controlled trials (RCTs), cluster-randomised controlled trials (c-RCT), controlled trials (CT), quasi-experimental studies, and observational studies	Studies that did not adopt a systematic review approach, narrative reviews, and primary studies.
Reviews involved participants between the ages of 6 to 18 years.	Reviews involved participants who are younger than 6 years or older than 18 years
Studies that explored at least one intervention for increasing PA among the targeted population	Reviews involving interventions unrelated to PA and movement.
Interventions that were implemented in schools and quantitative evaluations of PA	Reviews included interventions not conducted in schools or reviews discussing PA without incorporating an intervention
Studies published in Arabic or English language. Including only studies published in these languages is a practical decision based on several factors. First, the researcher is proficient in Arabic and English, which allows him to accurately interpret and critically appraise studies in these languages. Including studies in other languages would require translation services, potentially introducing errors and biases, and significantly increasing the time of the review. The current resources are limited, making it infeasible to translate and include studies from other languages without compromising the quality and feasibility of the review. Preliminary searches indicate that the majority of relevant studies are published in Arabic and English, so limiting the review to these languages does not exclude a significant volume of relevant studies. While repeating searches in other languages could provide a sense of the volume of studies, the initial searches	

suggest that the researcher would still capture the most significant and relevant studies by focusing on Arabic and English.	
Reviews based on search from December 2017.	

3.3.3 Literature Search Process

Systematic searches were conducted in PubMed/MEDLINE, Scopus and CINAHL. These databases were chosen not only because they are easily accessible but also because they contain a large volume of systematic reviews and meta-analysis, due to their public health scope. Furthermore, reference lists of included studies were searched to identify relevant studies. The search strategy employed the following keywords: (physical inactivity OR physical activity OR sedentary lifestyle OR school-based intervention OR school-based program OR school-based) AND (health policy OR polic* OR health promotion OR health impact OR school*) AND (young OR adolescent OR youth OR children OR teenager) AND (systematic OR Review OR meta-analysis).

3.3.4 Studies Selection

All records were exported to Mendeley reference manager software. Duplicate records and all studies whose titles or abstracts did not meet the inclusion criteria were excluded. Screening of studies was conducted by the researcher, titles and abstracts of records retrieved from searches were screened for inclusion, and any disagreement was resolved by discussion with the supervision team.

3.3.5 Data Extraction

A standardised approach was used to extract data from the selected studies, as recommended by Moher et al. (2015), including study details (author, year of publication, the title of the review, studies design included in the reviews, number of studies in each

review, interventions description, intervention duration, and follow-up durations, outcomes measured including PA levels and BMI and the main results.

3.3.6 Quality Assessment

To assess the methodological quality and risk of bias in the included reviews, the researcher employed the updated AMSTAR 2 version for assessing systematic reviews and meta-analyses as recommended by (Shea et al., 2017). The systematic reviews were categorized as having a final rating of high, moderate, low, or critically low overall quality. Any disagreements were resolved through discussion between the researcher and his supervision team.

3.4 Results

This results section contains three main parts: the search outcome, data extraction and synthesis, and quality of included reviews.

3.4.1 Search Outcome

The search was conducted in December 2023. The initial literature search produced a total of 2365 studies: PubMed/MEDLINE 1359, Scopus 290 and CINAHL 716. There were 682 duplicates, and after their exclusion, the 1683 remaining records' titles and abstracts were screened against the inclusion and exclusion criteria. The full texts of the remaining 54 studies were screened which led to the exclusion of 35 studies. The main reasons for exclusion were (1) having an inappropriate target population (n=8); (2) being protocols (n=2); (3) not school-based (n=5); (4) measured different outcomes (n=17) and (5) did not adopt a systematic review approach (n=3). Further articles (n=4) were identified from reference lists of included reviews (See Appendix 1 for excluded studies with reasons). A PRISMA flow diagram shows search results and further illustrates the selection process, including screening, eligibility, and inclusion of studies (Fig 3.1).

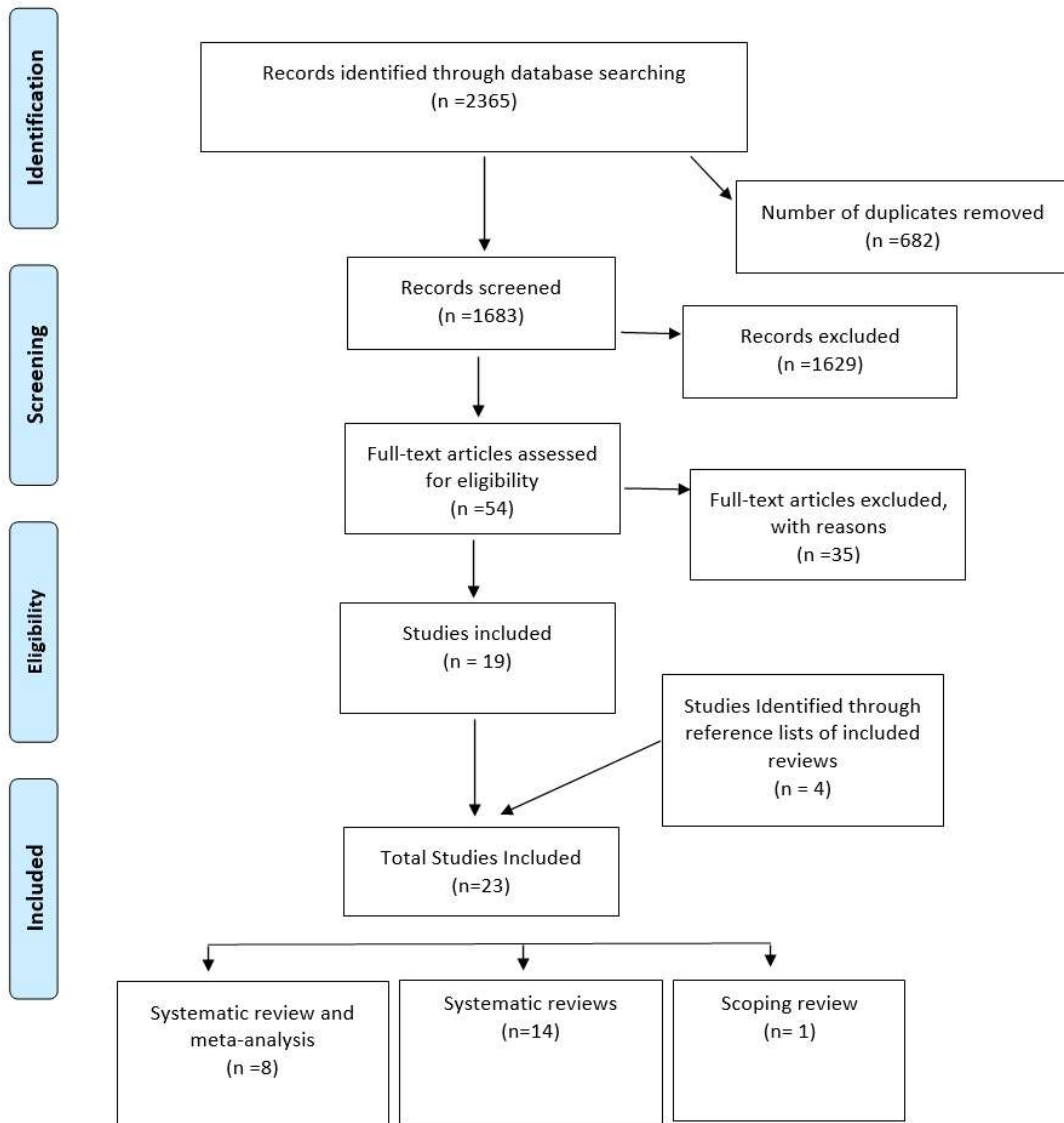


Figure 3.1: PRISMA Flow Diagram

3.4.2 Review characteristics

In total, 23 studies met the inclusion criteria, of which 14 were systematic reviews, eight were meta-analyses and one was a scoping review which adopted a systematic review approach. Review characteristics are summarised in Table 3.3 below. Most reviews were international and only four reviews targeted specific regions. One review focused only on Asian countries (Ahmed et al., 2021), one review focused only on school children in Latin America (Chavez & Nam, 2020) and one review focused on adolescents in Australia (Buru et al., 2020). All reviews included both males and females except one review which targeted only girls (Owen et al., 2017).

One review conducted by the author, focusing solely on the Middle East and Arabic-speaking countries (Alalawi et al., 2023), was included in the published paper corresponding to this chapter. However, it will not be discussed further here due to its specific regional focus, and instead, it will be detailed in the subsequent chapter to address the unique context of these regions.

Table 3.3: Characteristics of Included Reviews

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Yuksel et al., 2020 (1)	School-Based Intervention Programs for Preventing Obesity and Promoting PA and Fitness: A Systematic Review	RCTs, c-RCTs Non- RCTs and quasi-experimental studies	19	PA interventions in the form of increasing the duration of PE or changing its content, performing extracurricular PA	Primary and secondary school students aged 6 to 18 years	PA, BMI and PF	The shortest was six weeks and the longest was five years.	18 out of 19 studies reported significant improvements in at least one outcome related to obesity, PA, or PF. The review highlights the potential of school-based interventions to positively impact obesity prevention and the promotion of PA and fitness, particularly through programmes focused on PA.
Larouche et al., 2018 (2)	Effectiveness of active school transport interventions: a systematic review and update	RCTs, observational case studies, quasi-experimental studies	30	AST	school-aged children and adolescents (6–18-year-olds)	Change in PA	One year to three years	13 studies resulted in a statistically significant increase in AST, while 8 found no changes, and 5 did not report inferential statistics. The review underscores a considerable variation in intervention outcomes and suggests that multi-component interventions (combining education and encouragement,) tend to be more effective, though the overall quality of evidence was rated as low.

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Hanna et al., 2023 (3)	A Systematic Review of the Implementation and Effectiveness of ‘TDM’ on Markers of Children’s Health	Experimental and observational studies	16	TDM	Primary school children 6 to 11 years old	CRF, anthropometry and body composition, PA, cognition, and process evaluation	The shortest was three months and the longest was 12 months.	TDM positively impacts CRF and PA among primary school children. Despite its benefits, implementation barriers such as TDM's repetitive nature, time constraints, and inadequate facilities were noted, requiring schools to adapt the original TDM format for effective application.
Masini et al., 2020 (4)	Evaluation of school-based interventions of active breaks in primary schools: A systematic review and meta-analysis	RCTs and cohort studies	28	ABs	Primary school children 6–12 years old	PA, Classroom Behaviour, Cognitive Function, and Academic Achievement	The shortest was nine weeks and the longest was 6 months.	ABs in primary schools significantly increased PA levels, specifically MVPA and step count, while also improving classroom behaviour, particularly time on task. However, the effects on cognitive functions and academic achievements were inconclusive, suggesting that the impact of ABs may be more pronounced with curriculum-focused activities and active lessons that integrate key learning aspects.

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Moeini et al., 2021 (5)	Effect of interventions based on regular PA on weight management in adolescents: a systematic review and a meta-analysis	RCTs and experimental studies	14	Educational interventions	Children and adolescents aged 6 - 18 years old.	Change in BMI and the secondary consequence is the promotion of PA	The shortest was 8 weeks and the longest was 6 months.	Interventions led to a statistically significant weight loss of 1.02 kg compared to the control group (95% confidence interval: -4.794 to 0.222). The review underscores the effectiveness of these interventions in improving PA levels among adolescents, thereby contributing to weight management and loss.
Wong et al., 2021 (6)	Interventions to Increase MVPA in Elementary School PE Lessons: Systematic Review	RCTs and quasi-experimental studies	5	Intervention based on self-determination theory and the SEM	Children aged 8 to 11 years	Fitness infusions and physically active games	The shortest was six weeks and the longest was four years	Finding a pooled mean difference of +14.3% of lesson time spent in MVPA between intervention and control groups. This significant increase suggests that targeted interventions in PE lessons can effectively enhance children's PA levels during school hours.

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Vaquero-Solis et al., 2020 (7)	School-Based PA Interventions in Children and Adolescents: A Systematic Review	Quasi-experimental, c-RCT, Longitudinal studies	45	Interventions based on motivation for the promotion of PA and psychosocial benefits	Children and adolescents aged 6 - 18 years old.	Any physical or psychosocial outcome	The shortest was two weeks and the longest was 9 months	23 studies showed psychological effects post-intervention and 10 studies demonstrated psychosocial impacts. The review emphasizes the importance of motivational processes for engaging in PA and sports as precursors to psychosocial changes, highlighting the role of strategies and the duration of studies in maintaining significant changes over time.
Breslin et al., 2023 (8)	A systematic review of the effect of TDM on children's PA, physical health, mental health, well-being, academic performance and cognitive function	Quasi-experimental, c-RCT studies	13	TDM	school-aged children (aged 4–12 years)	PA levels, PF. Indicators of physical health status. mental health, psychological well-being, academic performance, and cognitive function	The shortest was one session of TDM and the longest was 12 months	A positive impact on increasing MVPA and PF in children, though it did not significantly affect BMI or academic performance. Notably, longer-term participation in TDM was associated with improvements in visual-spatial working memory and short-term mental health benefits, but no significant effects were observed on overall well-being or cognitive function.

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Schönbach et al., 2020 (9)	School-based interventions to promote active school transportation by bicycle among Children and adolescents: A Systematic review	RCTs and non-RCTs	9	An intervention aimed at promoting AST by bicycle	Primary and secondary school students of all ages	PA levels, PF, weight status, active travel and cycling skills	The shortest was four weeks and the longest was one year.	A lack of consistent significant improvements across the included studies. While some interventions, like the voluntary bicycle train accompanied by adults, showed promise in increasing cycling trips to school and improving psychosocial factors like parental and child self-efficacy.
Buru et al., 2020 (10)	The Efficacy of School-Based Interventions in Preventing Adolescent Obesity in Australia	Quasi-experimental and RCTs.	13	Use of height-adjustable desks to reduce classroom sitting time.	Adolescents (12 to 18 years old)	WC, Body fat, Body weight, Lean Mass, Energy expenditure, PA, screen time, Nutritional behaviour	The shortest was four months and the longest was two years with a follow-up of three years.	This review showed varying effectiveness. Multi-component interventions aligned with theoretical frameworks like Social Cognitive Theory and incorporating PA, dietary changes, and reductions in SB demonstrated promising results in managing obesity among adolescents.

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Brandes et al., 2022 (11)	A scoping review on characteristics of school-based interventions to promote PA and CRF among 6- to 10-year-old children	c-RCT, CT studies.	192	Most of the interventions were theory-based	School children aged 6 to 10 years	PA, CRF and SB	The average duration of the interventions was 44 weeks (ranging from 1 to 410 weeks)	It found that interventions frequently focused on single aspects, with "Health skills and education" being the most common feature, and highlighted that theory-based interventions, either single or multi-feature, showed potential for improving PA, CRF and SB outcomes.
Owen et al., 2017 (12)	The effectiveness of school-based PA interventions for adolescent girls: A systematic review and meta-analysis	RCTs, c-RCT, Quasi-experimental studies.	20	Most of them were multi-component interventions. Four of them were modified PE lessons. Two were educational-based interventions	Adolescent girls aged 11 to 18 years.	Objective measure or self-reported PA levels.	The shortest was six months and the longest was three years. Only two studies have a long-term follow-up (i.e., ≥ 12 months)	A small but significant effect of school-based PA interventions on increasing activity levels among adolescent girls ($g = 0.37$, $p < 0.05$), which diminished to a very small effect after outlier removal ($g = 0.07$, $p = 0.05$). The study highlights the challenges of modifying PA behaviours in adolescent girls through school programs. It suggests multi-component interventions and those grounded in theory may offer slightly more effective approaches, although overall impacts are modest.

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Chavez & Nam, 2020 (13)	School-based obesity prevention interventions in Latin America: A systematic review	RCTs, non-RCT, and quasi-experimental studies.	16	Multi-component school-based interventions	School children aged 6 to 18 years	BMI, PA levels, Z-score,	The shortest was four months and the longest was two years, with the shortest follow-up was five months and the longest one was two years.	Multi-component interventions which incorporated health education and parental involvement with a focus on healthy eating and PA, were most effective.
Masini et al., 2022 (14)	Evaluation of feasibility, effectiveness, and sustainability of school-based PA “active break” interventions in pre-adolescent and adolescent students: a systematic review	RCTs, Quasi-experimental studies	3	Physical active sessions and ABs.	Secondary and high school-aged 12 to 18 years	Quantitative assessments for PA levels or PF; or cognitive functions, classroom behaviours, quality of life, or well-being.	The shortest was 11 weeks and the longest was 7 months.	It found that such interventions are feasible and acceptable. Two studies demonstrated beneficial impacts on students' classroom behaviour and quality of life, while one study observed a rise in school PA levels. However, this increase did not extend to overall PA levels or to a decrease in SB.

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Carrasco-Uribarren et al., 2023 (15)	Improvement of In-School PA with Active School-Based Interventions to Interrupt Prolonged Sitting: A Systematic Review and Meta-Analysis	RCTs and CT studies	9	ABs	Children between 6 and 12 years old	PA, MVPA, SB	The shortest was 5 days and the longest was 3 years.	ABs in schools significantly improved PA and MVPA levels among children aged 6 to 12 years during school time. However, these interventions did not significantly reduce SB, highlighting the need for additional strategies to address prolonged sitting in school settings.
Nally et al., 2021 (16)	The Effectiveness of School-Based Interventions on Obesity-Related Behaviours in Primary School Children: A Systematic Review and Meta-Analysis of RCTs	RCTs, c-RCTs.	48	Most of them were multi-component interventions.	Children between 6 and 11 years old.	Change in PA, decrease in SB.	The shortest was 12 weeks and the longest was 4 years.	It found small positive effects on PA and significant reductions in both BMI and BMI z-score, showcasing their potential effectiveness in obesity prevention. However, there was no significant effect observed on SB, energy intake, or fruit and vegetable intake, highlighting areas for future improvement.

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Guirado et al., 2021 (17)	Effects of Classroom Active Desks on Children and Adolescents' PA, SB, Academic Achievements and Overall, Health: A Systematic Review	RCTs, non-RCT studies.	23	Refers to standing desks, sit-to-stand desks, or desks that promote standing. (Active upright desk), (Bike desk), (Exercise ball).	Children and adolescents aged 5–17 years	Body composition, SB and PA, energy expenditure, cognitive and academic performance and PF.	The shortest was two weeks and the longest was two years.	An increase of approximately 36% in energy expenditure was noted for bike desks and between 15% and 27.7% for active upright desks. Children showed improved inhibitory control and selective attention while using bike desks. Active desks seem to be a promising intervention in classrooms to enhance health-related outcomes.
Campos-Garzón et al., 2023 (18)	Contribution of active commuting to and from school to device-measured PA levels in young people: A systematic review and meta-analysis	Most studies were cross-sectional, two were longitudinal and one was a c-RCT.	14	Active commuting to and from school (ACS)	Children and adolescents aged 6 to 18 years	Accelerometer to measure PA.	Not reported	They found that ACS could contribute about 48% of the daily PA recommendations if both directions (home-school and school-home) are actively performed, emphasising the significant role of ACS in enhancing PA levels among the youth. Moreover, the study highlighted the need for future research to focus on promoting ACS as a means to increase daily PA levels in the young population.

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Bermejo-Cantarero et al., 2023 (19)	Are PA Interventions Effective in Improving Health-Related Quality of Life in Children and Adolescents? A Systematic Review and Meta-Analysis	RCTs and non-RCTs.	17	Most of them were adding extra (PE) lessons to the regular school curriculum. Few of them were short ABs	Children and adolescents aged 6 to 18 years.	Self-reported PA	The duration of the interventions varied from 2 to 12 months. Four studies carried out long-term follow-ups ranging from 3 months to 3 years.	PA interventions were found to be an effective strategy for improving overall health-related quality of life (HRQoL) and its significant domains, such as physical and psychological well-being, autonomy and parent relation, and social support and peers, in children and adolescents. However, the interventions did not significantly impact the school environment domain of HRQoL.
Pfledderer et al., 2021 (20)	School-based PA interventions in rural and urban/suburban communities: A systematic review and meta-analysis	RCTs and non-RCTs.	33	The intervention component was PE utilised 20 times. Classroom-based interventions were utilised 16 times.	Children and adolescents aged 6 to 18 years.	PA	The duration of the interventions varied from six weeks to two years.	A significant increase in total PA among participants, with school-based interventions demonstrating a positive effect across both rural and urban/suburban settings, suggests the effectiveness of such programmes in promoting PA among youth regardless of geographic location.

Author and Year	Title of the Review	The study designs included in the review	Number of included studies	Interventions description	Participants type and Age	Primary outcomes	Interventions Length included in the review	Summary of results
Ahmed et al., 2021 (21)	The effectiveness of PA interventions in Asian children and adolescents: a systematic review	RCTs, c-RCT, non-RCTs and quasi-experimental studies	30	Most of them used a theoretical framework/ model.	Children and adolescents aged 3 to 18 years.	Change in PA behaviours	The length of the interventions varied from one day to 60 months (with a median of 4.5 months).	It showed significant improvements in PA across both rural and urban settings. Both single and multicomponent strategies, involving PE, health education, and direct activity sessions, were effective. The review highlighted strong evidence for short-term interventions and the adaptability of programs across diverse cultural and environmental contexts in Asia.
Neil-Sztramko et al., 2021 (22)	School-based PA programs for promoting PA and fitness in children and adolescents aged 6 to 18 (Review)	RCTs, c-RCT	77	40 multi-component interventions. 19 school time PA. 15 enhanced PE	Children and adolescents 6 to 18 years old	Objective measure of PA or fitness. (Proportion of participants meeting PA guidelines and duration of MVPA and sedentary time).	The length of the interventions ranged significantly, from as short as 12 weeks up to 6 years, with 10 studies indicating that the intervention periods lasted 3 years or more.	Such interventions likely result in a modest increase in MVPA by approximately 0.73 minutes per day, with low to moderate certainty of evidence. Additionally, the review suggests these programmes may slightly decrease sedentary time by about 3.78 minutes per day and improve PF, as indicated by maximal oxygen uptake, yet with a very small and uncertain impact on BMI.

3.4.3 School-Based Interventions

Twenty-three studies were included in this umbrella review, and these studies were grouped according to age and intervention type.

3.4.3.1 Interventions for Children aged 6 to 12 Years

Seven reviews (Hanna et al., 2023; Masini et al., 2020; Wong et al., 2021; Breslin et al., 2023; Brandes et al., 2022; Carrasco-Uribarren et al., 2023; Nally et al., 2021) concerned interventions conducted in the primary schools setting for children aged between 6 and 12 years.

TDM (see page 9 for programme description): Two reviews (Breslin et al., 2023; Hanna et al., 2023) examined the effectiveness of this intervention. Breslin and colleagues observed considerable variability in the outcomes among the studies included. Concerning PA effects: Breslin et al. noted that a single session of the intervention led to a significantly higher duration of MVPA (10.67 ± 2.74 min) compared to the control group (0.44 ± 0.95 min). Another primary study in their review documented a significant rise in PA levels after eight months, with the intervention group averaging 9.1 more minutes of MVPA daily. Regarding PF effects: Six primary studies in Breslin et al.'s review indicated a notable improvement in fitness for the intervention group over the control group. However, making direct comparisons was challenging due to the different fitness tests used. In summary, Breslin et al. concluded that prolonged participation in the intervention enhanced both MVPA and PF in school-aged children. No significant changes were observed in academic performance or BMI; however, one study in their review suggested that TDM could briefly improve mental health (Breslin et al., 2023). Similar results were reported by Hanna and their colleagues. However, they also reported some implementation barriers for "TDM," such as its repetitive nature, time constraints due to competing curriculum demands, and

inadequate facilities. These challenges frequently require schools and teachers to modify and adapt the original TDM format (Hanna et al., 2023).

It should be noted that both Breslin et al. and Hanna et al. included largely the same primary studies, and the quality of the included studies assessed only by Breslin et al. was as follows: one study was excellent, six were good, five were fair, and none of them were of poor quality.

ABs (see page 9 for programme description) was evaluated by two systematic reviews (Carrasco-Uribarren et al., 2023; Masini et al., 2020) for its effectiveness. Carrasco-Uribarren and colleagues observed significant enhancements in both PA and MVPA levels. They reported that six studies showed a notable increase in school PA (Standardized Mean Difference = 0.46; 95% Confidence Interval: 0.28, 0.64; I^2 : 52%). Additionally, five studies demonstrated a significant increase in MVPA (Mean Difference = 3.20; 95% CI: 3.06, 3.35; I^2 : 0%), although the decrease in SB was not significant (SMD = -0.95; 95% CI: -2.06, 0.15; I^2 : 98%). Masini and their colleagues also reported similar findings, as they found that ABs significantly increased PA levels, MVPA, and step count among primary school children. Their meta-analysis demonstrated a statistically significant result for step count ($p < 0.00001$, CI 95% -0.71, 1.21) (random model I^2 = 0%) (Masini et al., 2020).

It should be noted that both reviews, Carrasco-Uribarren et al. and Masini et al., included five matching primary studies. Upon review, both analyses concurred that the methodological quality of most of the included studies in Carrasco-Uribarren et al.'s review was generally low, presenting a very high risk of bias. Furthermore, the five RCTs analysed in Masini et al.'s review were deemed of poor quality, while the 11 cohort studies were assessed to be of medium quality.

Theory-based interventions: One review by Brandes et al. (2022) reviewed various school-based interventions aimed at promoting PA and CRF among children aged 6 to 10 years. These interventions were diverse, typically focusing on one or more elements of the WHO Health Promoting Schools framework, which includes school health policies, the physical and social school environments, health skills and education, community and parental links, and access to health services. Most interventions incorporated health education components that aimed to increase children's knowledge and engagement in physical activities. Practical activities often included structured physical sessions like sports or games and environmental modifications to encourage active play. Many programmes were delivered by classroom or PE teachers, with some involving parents or community members to reinforce the learned behaviours outside the school setting. Outcomes were measured using a mix of tools, from objective devices like accelerometers to self-reported questionnaires, assessing impacts on PA levels, CRF, and SB. The effectiveness of these interventions varied, with some showing significant benefits in promoting PA and improving fitness, while others had limited or no observable effects. Such mixed results highlight the complexities of designing and implementing effective health-promoting interventions in school settings.

In summary, Brandes et al. (2022) identified a higher percentage of interventions based on theory were found to be effective, particularly those focusing on PA and CRF. Single-feature interventions showed effectiveness, but no specific combination of features was identified as significantly more effective than others. Interventions that made changes to the physical environment or offered direct health skills education were among those that showed positive results.

It should be noted that, the quality of the studies included in this review was not assessed, as the authors did not evaluate the risk of bias.

Multi-component interventions: In the review by Nally et al. (2021), most interventions (70%) were multi-component interventions. These interventions are quite diverse and include several components focused on increasing PA, reducing SB, and improving nutrition.

One common intervention strategy was the use of health education sessions and nutrition education interventions, highlighting the importance of nutritional knowledge in influencing dietary behaviours. Some interventions involved creative methods such as the use of a board game called 'Kaledo' to enhance nutrition knowledge. This game was employed as a strategy to modify nutritional behaviours by making learning about nutrition interactive and engaging. Other strategies mentioned include modifications to the physical school environment, such as creating more opportunities for PA during school hours. This included facilitating active academic lessons and introducing activity breaks to reduce sedentary time among students. Additionally, some schools adapted their environments to encourage more PA by incorporating more brisk walking during school hours and organising active homework and break time activities.

They found that interventions in children led to a slight positive effect in the treatment group compared to the control group (2.14; 95% CI = 0.77, 3.50). No significant changes were noted in SB, energy intake, or fruit and vegetable consumption. However, significant decreases were seen in BMI kg/m² (-0.39; 95% CI = -0.47, -0.30) and BMI z-score (-0.05; 95% CI = -0.08, -0.02), favoring the intervention group. Nevertheless, the quality of most studies included in this review was considered to be at a low risk of bias.

Physical education lessons: The latest review focusing on this age group conducted by Wong et al. (2021), investigates various interventions designed to enhance MVPA during PE lessons for elementary school children. The interventions explored in the review utilised different strategies to increase activity levels, including the application of self-

determination theory to improve teaching methods and enhance teacher motivation styles. Some studies within the review employed PE specialists or expert instructors, focusing on delivering high-quality, engaging PE sessions that encourage vigorous activities among students. Additionally, several interventions incorporated 'fitness infusions' and active games, designed to actively engage students and increase their PA levels. Educational components were also highlighted, with some interventions providing students with knowledge about the benefits of PA, thereby increasing their engagement. The effectiveness of these interventions was primarily measured through the increased percentage of lesson time students spent in MVPA, assessed objectively by accelerometers. Furthermore, this review showed favourable intervention effects on children's MVPA in all the studies, with a pooled effect of 14.3% higher lesson time in MVPA in the intervention groups. This increase is equivalent to around a 9-minute improvement in MVPA per 1 hour of PE lesson time, with the range was from a 4% to 30% difference in the MVPA content of PE lessons. The review suggests that well-designed PE programmes can significantly contribute to enhancing children's PA levels during school hours. It should be noted that evidence quality was generally high in this review.

3.4.3.2 Interventions for Adolescents aged 12 to 18 Years

Out of the twenty-three reviews, only three (Buru et al., 2020; Owen et al., 2017; Masini et al., 2022) investigated interventions conducted in secondary schools for adolescents aged between 12 and 18 years.

Multi-component interventions : Buru et al. (2020) critically assess the impact of school-based interventions on adolescent obesity in Australian schools, with a primary focus on changes in PA levels and a secondary focus on changes in BMI. The review synthesises findings from thirteen studies that incorporated various interventions aimed at modifying PA, SB, and nutritional habits among adolescents aged 12 to 17 years.

The review's analysis reveals that interventions combining PA enhancements with nutritional education were notably more effective. This effectiveness was particularly pronounced when the interventions were grounded in robust theoretical frameworks, such as the Social Cognitive Theory, which helped structure the intervention components effectively. The primary outcome, changes in PA levels, showed that interventions specifically designed to increase PA through structured school-based programmes yielded positive results in several studies. However, the overall impact on PA levels was mixed across the reviewed studies, with some interventions achieving significant improvements in PA, while others showed minimal or no changes.

As for the secondary outcome, the objectively measured BMI, the results were similarly mixed. A few of the interventions successfully resulted in significant reductions in BMI among participants, demonstrating the potential of school-based programmes to influence weight management. However, like the findings for PA levels, many studies reported no significant changes in BMI, highlighting the variability in intervention success and the complexity of effectively reducing BMI through school-based programmes alone.

The mixed outcomes reported in the review suggest that while some school-based interventions can effectively increase PA levels and reduce BMI, the success of these interventions is highly dependent on their design, implementation, and the theoretical underpinnings. Buru et al. recommend further research to explore the barriers and enablers affecting the implementation of these programmes, which could lead to more refined strategies that are consistently effective across diverse school settings.

The quality assessment of included studies revealed that 11 studies were of medium quality, and two studies were of high quality.

The systematic review and meta-analysis by Owen et al. (2017) investigate the effectiveness of school-based PA interventions targeted at adolescent girls. The meta-

analysis, which included 17 studies, revealed a small significant positive effect on PA levels initially ($g = 0.37$, $p < 0.05$), but this effect size reduced considerably to $g = 0.07$ ($p = 0.05$) after adjusting for an outlier, indicating a very modest overall impact. The review also noted that multi-component interventions and those underpinned by theoretical frameworks showed very small but significant improvements in activity levels. Although the primary focus was on PA and not all studies reported on BMI changes, the minimal impact observed suggests the need for more robust and comprehensive intervention strategies. The findings underscore the challenges of effecting significant changes in PA behaviours among adolescent girls through school-based interventions.

The quality assessment for included studies revealed that ten studies were classified as having a moderate risk of bias, six studies were weak, three were strong, and one had a very strong risk of bias.

ABs (see page 9 for programme description): The review by Masini et al. (2022) assessed the effectiveness of "active break" interventions in enhancing PA levels, classroom behaviour, cognitive functions, and well-being. They reviewed three studies about PA lessons and ABs, with intervention periods ranging from 11 weeks to 7 months.

The review found that "ABs" have a positive impact on students' classroom behaviour and quality of life. One of the studies included in the review noted a significant increase in school PA levels after the intervention, although this increase did not extend to overall PA levels or reduce SB. All studies demonstrated that "ABs" interventions are feasible and acceptable in these educational settings. Despite these positive findings, the review highlighted the need for longer-term studies to further understand and optimise these interventions. The quality assessment revealed that one study was of good quality, one was of poor quality, and one was of fair quality.

3.4.3.3 Interventions for both Children and Adolescents aged 6 to 18 Years

Out of the twenty-three reviews, twelve (Yuksel et al., 2020; Larouche et al., 2018; Moeini et al., 2021; Vaquero-Solís et al., 2020; Schönbach et al., 2020; Chavez & Nam, 2020; Guirado et al., 2021; Campos-Garzón et al., 2023; Bermejo-Cantarero et al., 2023; Pfladderer et al., 2021; Ahmed et al., 2021; Neil-Sztramko et al., 2021) considered interventions conducted in both primary and secondary schools for children and adolescents aged between 6 and 18 years.

AST (see page 10 for programme description): Three reviews (Larouche et al., 2018; Campos-Garzón et al., 2023; Schönbach et al., 2020) investigated interventions related to "AST" and "active commuting to and from school." In the first two reviews (Larouche et al., 2018; Campos-Garzón et al., 2023), accelerometers were used to measure PA in all studies included, while in the review of Schönbach et al. accelerometers, questionnaires and practical cycling tests were used to objectively assess cycling skills as part of PA outcome.

Larouche et al. reported that 13 interventions led to a statistically significant rise in "AST", whereas eight reported no changes, four recorded inconsistent results, and five did not provide inferential statistics. Campos-Garzón et al. included 14 studies, of which 11 were cross-sectional and two were longitudinal studies. Their meta-analysis found that active commuting to and from school significantly enhances PA among youth aged 6 to 18 years. Specifically, active commuting contributed about 48% of the recommended PA on school days. The review showed an increase of 19.55 minutes per day in light PA and 8.98 minutes in MVPA during the home-to-school trip. For the school-to-home trip, there was an increase of 68.74 minutes per day in Light PA and 20.07 minutes in MVPA.

The review by Schönbach et al. (2020) focused on interventions aimed at increasing cycling to school among children and adolescents. The study analysed nine interventions and found that most were of weak methodological quality but identified promising strategies like

bicycle trains, which effectively increased cycling. The interventions utilised behaviour change techniques such as shaping knowledge and demonstrating behaviours, leading to increased MVPA and improved self-efficacy and parental expectations about cycling. Despite these positive outcomes, the results varied significantly across included studies.

It should be noted that most of the included studies in the reviews by Larouche et al. and Schönbach et al. were rated as poor quality and had severe limitations in the design and implementation of interventions. Therefore, they attributed a low grade for the overall quality of evidence. For the review conducted by Campos-Garzón et al., most studies had a low risk of bias and medium quality.

Multicomponent interventions: The review by Chavez & Nam (2020) evaluated the effectiveness of school-based obesity prevention interventions in Latin America. The study analysed 16 interventions aimed at preventing obesity among school-aged children by incorporating school-based components. Most interventions were focused primarily on dietary changes, while a smaller number combined diet with PA enhancements. Three interventions stood out for their moderate quality and effective multi-component approach, which included health education, parental involvement, and changes to the school environment, all aimed at promoting healthy eating and PA.

The review found that over 60% of the analysed interventions produced a significant effect on at least one outcome related to diet, PA, or obesity. Specifically, five of the included studies showed significant improvements in PF tests and/or PA duration. Additionally, interventions lasting more than three months reported sustained PA levels.

It should be noted that most of the included studies (13 out of 16) in the review conducted by Chavez & Nam (2020) were rated as weak in quality.

Single component interventions: The review by Yuksel et al. (2020) systematically examined the effectiveness of school-based interventions aimed at preventing obesity and promoting PA and PF. The review analysed 19 interventions, finding that the majority (18 out of 19) showed significant improvements in at least one outcome related to diet, PA, or obesity. Notably, interventions that primarily focused on PA demonstrated higher success rates across various variables compared to multi-component programmes that did not centralise PA. This suggests that direct PA interventions are crucial for achieving sustained benefits. Additionally, programmes with a follow-up period longer than three months reported sustained PA levels, indicating the importance of longer-term interventions for maintaining health benefits.

Three interventions were highlighted due to their moderate quality and effective multi-component approach, which included health education, parental involvement, and changes to the school environment to promote healthy behaviours. These comprehensive strategies highlight the potential of school-based interventions in significantly contributing to obesity prevention and the promotion of PA and PF among school-aged children. The review emphasised that the quality, duration, and primary focus on PA are key factors in determining the effectiveness of these interventions. It should be noted that 10 included studies were rated as strong quality, whereas nine studies were rated as moderate quality.

Educational interventions: The systematic review conducted by Moeini et al. (2021) aimed to assess the impact of educational interventions designed to enhance regular PA for weight management among adolescents. The meta-analysis integrates findings from 14 studies and indicates that these interventions notably promote regular PA and effectively contribute to weight management and weight loss. The review suggests that interventions employing a variety of methods, including training classes, counselling, practical training by sports coaches, and digital platforms like apps and social media, significantly improved

the likelihood of regular PA. Although the review lacks specific details on the measurement methods for PA in each study, it typically involved a combination of self-reported and objective measures. The analysis showed a mean weight loss of 1.02 kg in the intervention groups compared to control groups, though results varied widely across studies ($I^2 = 88.9\%$). The review highlights the effectiveness of theory-based interventions, particularly those that leverage structured environments such as schools, underscoring the importance of well-designed, theory-informed programmes in promoting PA and managing weight among adolescents. The quality assessment revealed that six of the included studies were of high quality, four were of medium quality, and four were of weak in quality (Moeini et al., 2021).

Active desks (see page 10 for programme description): Guirado et al. (2021) conducted a systematic review to investigate the effects of active desks in school settings on SB, PA, academic achievement, and overall health. They included 23 studies, in which active desks were categorized into three forms: upright active desks, cycling desks, and stability balls. The review demonstrated that the use of cycling desks increased energy expenditure by approximately 36%, while upright active desks increased it by 15% to 27.7%. Additionally, the use of cycling desks improved children's inhibitory control and selective attention. Despite the varied quality and results among the studies, which limits comprehensive conclusions for each type of active desk, the evidence suggests that active desks can be a promising intervention in classrooms to improve health-related outcomes.

The review highlighted that active desks, especially cycling and upright types, show considerable promise in reducing sedentary time and enhancing PA among school-aged children. This approach not only contributes to increased energy expenditure but also supports cognitive improvements, particularly when using cycling desks. Overall, the findings underscore the importance of integrating active furniture like desks into school

environments to foster healthier behaviours and potentially improve academic performance among children and adolescents. The overall quality of the included studies in the review by Guirado et al., (2021) was assessed as low.

Motivational interventions: Vaquero-Solís et al. (2020) examined the effects of motivational interventions based on PA as a precursor to psychosocial benefits among children and adolescents. The review included 45 studies, with 39 presenting a quasi-experimental design. The average duration of the intervention programmes ranged between five and twenty weeks. Vaquero-Solís et al. reported that, out of the 45 studies, 23 demonstrated psychological effects, 10 showed psychosocial effects following the intervention, and the remaining studies reported changes that were not significant. Furthermore, the majority of the reviewed studies were grounded in theoretical models such as the Achievement Goal Theory and the Self-Determination Theory. The review underscored the importance of motivational processes in the implementation of PA and sports as precursors to psychosocial changes, highlighting the significance of strategies and the duration of interventions/programmes. Notably, longer interventions were associated with a more sustained impact on behaviour, maintaining significant changes over time. The majority of the studies included in the review by Vaquero-Solís et al. (2020) were rated as high quality, with a few being of medium quality.

Geographically specific reviews

Ahmed et al. (2021) assessed the effectiveness of interventions aimed at enhancing PA among children and adolescents in Asian countries. Their review included 30 studies, of which 21 were school-based and 16 utilised a c-RCT design. The interventions varied widely in duration, ranging from a single day to 60 months, with a median of 4.5 months. The primary focus was on changes in PA, assessed through device-based tools like accelerometers and pedometers in four studies, while the remaining studies relied on self-

reported measures, such as questionnaires. Seventeen of the studies applied a theoretical framework or model, and eight employed multiple intervention strategies. These strategies comprised a mix of PA sessions, exercises, and various physical activities (including indoor and outdoor activities, aerobic dance, rope skipping, and PE sessions). Others focused on educational interventions. Fifteen studies reported significant improvements in PA behaviour or PF, and these were considered of moderate to high quality. The findings suggest that both single and multicomponent interventions, particularly short-term ones (up to six months) that include PA sessions, PE, and health education, can effectively increase the overall PA levels in Asian children and adolescents.

Rural and urban settings: Pfledderer et al. (2021) conducted a systematic review and meta-analysis to assess the effectiveness of school-based PA interventions in enhancing the total PA among youth, comparing rural and urban/suburban settings. The review synthesised data from 33 studies, with a significant but small increase in daily PA (Hedge's $g = 0.12$, 95% CI: 0.06–0.18) observed in the total sample. Urban and suburban interventions also showed a significant but modest increase in PA (Hedge's $g = 0.12$, 95% CI: 0.06–0.19). However, interventions in rural schools did not show a significant effect (Hedge's $g = 0.06$, 95% CI: -0.50 to 0.61), highlighting a disparity in intervention effectiveness based on geographic setting.

The review also noted high heterogeneity in the results ($I^2 = 84.6\%$ for all studies), suggesting varied intervention outcomes across different studies and settings. Despite the overall positive impact of these interventions in urban and suburban schools, the negligible effect in rural schools indicates a need for targeted strategies to overcome unique barriers in these areas. The study emphasises the importance of including before and after school components, as well as family and community engagement, to enhance the effectiveness of PA interventions, particularly in rural settings where children are less likely to engage in

PA outside of school hours. This suggests that the effectiveness of interventions can be influenced by the context, highlighting that programmes effective in one school setting might not necessarily succeed in another, especially in more rural areas. Notably, the quality of the included studies was not assessed for risk of bias by Pfledderer and colleagues.

Impact on MVPA and fitness: Neil-Sztramko et al. (2021) explored the effectiveness of interventions aimed at increasing MVPA and enhancing fitness among 66,752 individuals across 89 studies. The interventions reviewed included 40 multi-component interventions, 19 focused on school-time PA, 15 on enhanced PE, and 14 on before-and-after school programmes. The length of these interventions showed considerable variation, ranging from as short as 12 weeks to as long as 6 years, with 10 studies extending over three years or more.

The findings indicate that school-based interventions may lead to a slight increase in time spent in MVPA, with an average increase of 0.73 minutes per day (95% CI: 0.16 to 1.30). There was also a slight reduction in SB, with an average decrease of 3.78 minutes per day (95% CI: -7.80 to 0.24), and a noticeable enhancement in PF, as indicated by an increase in maximal oxygen uptake (VO₂max) of 1.19 mL/kg/min (95% CI: 0.57 to 1.82). Furthermore, these interventions may lead to a small decline in BMI z-scores, with an average reduction of -0.06 (95% CI: -0.09 to -0.02). Regarding the quality of the included studies, 33 were rated as moderate quality, and 56 as low quality.

Impact on HRQoL: Bermejo-Cantarero et al. (2023) analysed the effectiveness of PA interventions in improving various domains of health-related quality of life (HRQoL). The review, which included 17 studies, revealed that PA interventions produced a pooled effect size of 0.179 (95% CI: 0.045, 0.002) for the total HRQoL score. More specifically, physical well-being showed an improvement with an effect size of 0.192 (95% CI: 0.077, 0.306), while psychological well-being had an effect size of 0.158 (95% CI: 0.080, 0.237).

Autonomy and parent relation, as well as social support and peers, also saw enhancements with effect sizes of 0.118 (95% CI: 0.044, 0.192) and 0.135 (95% CI: 0.043, 0.227) respectively. However, the school environment domain did not exhibit significant positive effects, suggesting that PA interventions may not impact this area of HRQoL substantially.

The analysis highlighted that the benefits of PA interventions on HRQoL are not significantly influenced by whether they increased PA levels or by the type and duration of the intervention. This suggests that both PA-focused and multi-component interventions (those that include other behaviours such as nutrition and sleep alongside PA) are equally effective in enhancing HRQoL. The review also noted a moderate to considerable inconsistency among the results for different domains, indicating variability in how different PA interventions impact HRQoL among children and adolescents. These findings underline the potential of PA interventions as a valuable strategy for improving significant domains of HRQoL in young populations. Regarding the risk of bias in the included studies, six out of the 17 were classified as having a high risk of bias, four were of medium risk, and seven were of low risk.

3.5 Quality Assessment of Included Reviews

The methodological quality of the included reviews was classified into four categories: high, moderate, low, or critically low overall quality (see Appendix 3 for the criteria for these gradings). Seven reviews were high-quality, four reviews were moderate quality, five reviews were low-quality, and seven reviews were critically low. Most reviews did not report on the sources of funding for the studies included in the review, with the exception of one review (Neil-Sztramko et al., 2021). Similarly, most studies did not provide a list of excluded studies nor justify the exclusions, except for one study (Breslin et al., 2023). Three reviews out of 23 failed to assess the risk of bias in included studies, and two of them did not account for the risk of bias in individual studies when interpreting/discussing the results

(Pfledderer et al., 2021; Brandes et al., 2022; Hanna et al., 2023). Furthermore, six studies did not explain their selection of the study designs for inclusion in their reviews (Yuksel et al., 2020; Larouche et al., 2018; Vaquero-Solís et al., 2020; Buru et al., 2020; Owen et al., 2017; Chavez & Nam, 2020). Nine studies did not include the components of PICO (Population, Intervention, Comparison, Outcome) in the research questions and inclusion criteria (Yuksel et al., 2020; Hanna et al., 2023; Buru et al., 2020; Owen et al., 2017; Chavez & Nam, 2020; Carrasco-Uribarren et al., 2023; Nally et al., 2021; Guirado et al., 2021; Bermejo-Cantarero et al., 2023). Six studies failed to perform duplicate in studies selection or data extraction (Hanna et al., 2023; Wong et al., 2021; Vaquero-Solís et al., 2020; Owen et al., 2017; Chavez & Nam, 2020; Pfledderer et al., 2021).

Eight out of the twenty-three reviews conducted a meta-analysis. Four out of the seven studies used partially appropriate methods for the statistical combination of results and assessed the potential impact of risk of bias in the included studies on the results and evidence synthesis (Wong et al., 2021; Owen et al., 2017; Campos-Garzón et al., 2023; Pfledderer et al., 2021). The quality assessment findings are presented in Appendix 2.

3.6 Discussion

The main purpose of this umbrella review was to comprehensively evaluate the effectiveness of school-based PA interventions among children and young people aged 6 to 18 years internationally. A total of 23 reviews were included, with seven reviews implemented in primary schools among children aged 6 to 11 years, three reviews conducted in secondary schools among adolescents aged 12 to 18 years, and thirteen reviews targeting both children and adolescents aged 6 to 18 years. Our ability to draw solid conclusions was limited due to the low quality of either the systematic review or meta-analysis, or because, as mentioned in several reviews, the quality of the included studies was weak because some primary studies included had a high risk of bias and were unclear

in certain cases (Larouche et al., 2018; Schönbach et al., 2020; Guirado et al., 2021; Neil-Sztramko et al., 2021; Chavez & Nam, 2020; Carrasco-Uribarren et al., 2023; Bermejo-Cantarero et al., 2023). Nevertheless, a few approaches appear more promising in encouraging PA than others.

This umbrella review identified various school-based interventions and found mixed findings, indicating that effectiveness varies with age. Among the reviews examining interventions in primary school environments for children aged 6 to 12 years, two interventions were promising in increasing PA and showed a significant increase in PA, PF, and MVPA. Specifically, TDM (Breslin et al., 2023; Hanna et al., 2023) and ABs (Carrasco-Uribarren et al., 2023) were noted for their effectiveness. Globally, over 15,600 schools and other settings have implemented TDM, which has seen rapid adoption over the last ten years (Breslin et al., 2023). Additionally, evidence indicated that long-term participation in TDM could improve MVPA by nearly ten minutes a day, and PF is positively impacted by the programme (Breslin et al., 2023). In primary school children, this increase is relatively greater than that found in other PA interventions. However, it has been shown that children do not engage in MVPA for the full 15 minutes allocated for TDM. Despite this, the increase in MVPA levels is promising, as higher MVPA is linked to improved cardiometabolic health (Ekelund et al., 2012). Nevertheless, as Breslin et al. (2023) suggest, more rigorous research is needed to ensure that any changes are directly related to the components of TDM and are maintained after the intervention period. This requires high-quality studies with proper randomisation and extended follow-up.

ABs were implemented in three forms: general active breaks, active breaks centred around the curriculum, and lessons that incorporate PA. Two reviews recorded a significant enhancement in PA and MVPA with no significant reduction in SB (Carrasco-Uribarren et al., 2023; Masini et al., 2020). Therefore, these two specific interventions (TDM and ABs)

appear to contribute to achieving the public health recommendation of 60 minutes of MVPA per day for children.

Among the reviews that investigated interventions conducted in secondary schools for adolescents aged 12 to 18 years, multicomponent interventions in two reviews (Buru et al., 2020; Owen et al., 2017) demonstrated a very small and nonsignificant effect on PA levels. These findings align with those of a previous umbrella review in the same field (Mannocci et al., 2020), which reported that school-based interventions targeting adolescents do not have significant effects and are of questionable value. Owen et al. suggest that during adolescence, complex physiological and psychological changes occur, which may complicate efforts to change behaviour (Owen et al., 2017).

Reviews including both children and adolescents found mixed findings for school-based interventions. AST demonstrated a statistically significant increase in active school transport when PA was objectively measured (Larouche et al., 2018). For MVPA, the aggregated AST weighted MVPA was 8.98 minutes (95% CI: 5.33–12.62; $I^2 = 99.95\%$, $p < 0.001$) during the trip to school and 20.07 minutes (95% CI: 13.62–26.53; $I^2 = 99.62\%$, $p < 0.001$) for the return journey from school (Campos-Garzón et al., 2023). Thus, active commuting interventions could provide 50% of the PA guidelines for school-aged children on school days, when both directions of the trip are actively performed.

Single-component interventions focusing on PA-related interventions, such as expanding the length of PE or altering its content, performing extracurricular PA, participating in activities during breaks and lunch breaks, or providing activity breaks in classes other than PE, demonstrated a small but significant increase in PA levels, especially when they focused on orientation and training (Yuksel et al., 2020). Educational interventions concerning diet, PA, and education showed a statistically significant effect on weight loss and a significant increase in PA, especially when PA programmes employed a multi-

component approach integrated into the school curriculum and included teachers, parents, and students (Moeini et al., 2021). These results align with previous reviews indicating that programmes integrating diet and PA produced higher benefits than single strategies alone (Oosterhoff et al., 2016; Williams et al., 2013; Wolfenden et al., 2017). Furthermore, we found that a long-term intervention was another key component of effective interventions. The results of this review are consistent with those of previous studies, which found that school-based interventions were successful when they had a duration of one school year or more and were less successful in those that lasted less than six months (Drouka et al., 2023).

Active desk interventions demonstrated a small effect on BMI reduction, a significant decrease in sitting time during school hours, and statistically significant increases in standing time (Guirado et al., 2021). Motivational interventions exhibited psychosocial effects post-intervention when based on theoretical models such as the Achievement Goal Theory and Self-Determination Theory (Vaquero-Solís et al., 2020). These findings align with a previous narrative review (Drouka et al., 2023), which examined the effectiveness of school-based interventions in Europe and noted that ineffective school-based interventions often lacked a well-defined theoretical framework. This indicates the importance of grounding school-based PA interventions in theoretical models to enhance their effectiveness.

Multi-component interventions demonstrated little to no increase in MVPA, little to no decrease in sedentary time, a minimal decrease in BMI, and a slight improvement in PF (Neil-Sztramko et al., 2021). Additionally, incorporating extra PE lessons into the regular school curriculum, along with a few instances of short active breaks, showed a positive effect on several domains of health-related quality of life, such as physical well-being and psychological well-being (Bermejo-Cantarero et al., 2023). Despite these varied outcomes, schools remain a crucial setting for promoting PA, as they interact more frequently with

school-aged children during the first two decades of their lives than any other institution. Furthermore, as indicated by McIntosh et al. (2017), a youth's ability to increase their level of PA and sustain it may be heavily influenced by their social environment and social support system. It is unlikely that an individual will begin to walk to school if no one else does so (McIntosh et al., 2017). Additionally, Vaquero-Solís et al. (2020) reported in their review that the behaviour of peers has a profound effect on young people's behaviour.

In this umbrella review, both observational and interventional studies were included to provide a comprehensive understanding of the effectiveness of school-based PA interventions. Specifically, reviews such as Larouche et al. (2018), which included observational studies, and Yuksel et al. (2020), which predominantly focused on interventional studies, were included to capture a broader range of evidence. Observational studies provide valuable insights into real-world implementation, adherence, and long-term sustainability of interventions, which are often not fully captured in controlled trial settings. They offer evidence on how interventions function in typical school environments without the strict control conditions of RCTs. This can highlight potential barriers to implementation, variations in outcomes based on contextual factors, and provide external validity to the findings of interventional studies.

On the other hand, interventional studies, such as those included in the reviews by Yuksel et al. (2020) and Masini et al. (2020), are essential for establishing causal relationships between the interventions and outcomes. They provide structured and controlled data on the efficacy of specific PA interventions, enabling a more precise assessment of their impact on PA levels and related health outcomes. Including both types of studies allows for a balanced assessment: interventional studies contribute rigorous evidence of what can work under controlled conditions, while observational studies offer insights into how these interventions operate in varied real-world settings. This combined approach helps to inform

recommendations that are both evidence-based and applicable in diverse school environments, enhancing the overall utility and relevance of the review findings.

Both the methods and reporting of systematic reviews in the topic area could be improved. For example, most reviews failed to report on the sources of funding for the studies included in the review. Additionally, most studies did not provide a list of excluded studies nor justify the exclusions. Three reviews out of 23 failed to assess the risk of bias in included studies, and two of them did not account for the risk of bias in individual studies when interpreting/discussing the results (Pfledderer et al., 2021; Brandes et al., 2022; Hanna et al., 2023). Nine studies did not include the components of PICO in their research questions and inclusion criteria. Despite these limitations, it was challenging to draw concrete conclusions due to the low quality of some included studies. Consequently, further high-quality research is necessary to determine the effectiveness of PA interventions.

3.6.1 Strengths and Limitations of Primary Studies Included in Reviews

The key strength of the studies included in reviews lies in the diversity and range of programmes evaluated, along with the variety of outcome measures used. Additionally, eleven reviews included high to medium-quality primary studies. However, there are notable limitations. Firstly, the quality of primary studies was cited as a limitation by the authors of some reviews. Moreover, it was indicated that some primary studies included had a high risk of bias and were unclear in certain cases (Larouche et al., 2018; Schönbach et al., 2020; Guirado et al., 2021; Neil-Sztramko et al., 2021; Chavez & Nam, 2020; Carrasco-Uribarren et al., 2023; Bermejo-Cantarero et al., 2023). As a result, relying on the conclusions of a systematic review for decision-making could be problematic if the primary studies were flawed. Secondly, there's a trade-off related to evaluating "real-world" programmes and the lack of rigorous RCTs. The impossibility of blinding means that reliance on self-reported outcomes was problematic.

3.6.2 Strengths and Limitations of the Included Reviews

The included reviews exhibit several notable strengths. The diversity in study designs, ranging from RCTs to observational studies, enhances the robustness of the conclusions, providing a comprehensive understanding of school-based PA interventions' effectiveness. Geographic and demographic diversity further bolsters the findings' generalisability, ensuring applicability across different cultural and regional contexts (Ahmed et al., 2021). Overall, the reviews included a wide range of outcomes, though some were more focused, offering a holistic assessment of the interventions' impact on physical and mental health.

However, the reviews also have limitations that must be considered. The heterogeneity of the interventions, with varying components and implementation strategies, complicates the synthesis of results and makes it challenging to pinpoint the most effective elements. Variability in outcome reporting and the quality of evidence, with some reviews rated as low (Wong et al., 2021; Breslin et al., 2023; Schönbach et al., 2020; Owen et al., 2017; Pfladderer et al., 2021) or critically low (Yuksel et al., 2020; Larouche et al., 2018; Hanna et al., 2023; Vaquero-Solís et al., 2020; Buru et al., 2020; Brandes et al., 2022; Chavez & Nam, 2020), based on the AMSTAR 2 tool for assessing systematic reviews, further limit the strength of the conclusions. The region-specific reviews may limit the generalisability of findings to other contexts. These limitations highlight the need for more standardised, high-quality research to better understand and improve school-based PA interventions.

3.6.3 Strengths and Limitations of the Umbrella Review

The key strength of this umbrella review is that it is the first to systematically assess the most recent scientific evidence on school-based PA interventions to promote PA among children and adolescents around the world. Furthermore, an in-depth quality assessment was conducted using the latest version of the AMSTAR 2, a tool for assessing systematic reviews. In addition, bringing these findings together has provided a comprehensive picture

of the school-based PA interventions that are most likely to increase school children's and adolescents' levels of PA. However, this umbrella systematic review has some limitations. Firstly, the searches were limited to studies published in English and Arabic language which may led to missing potentially relevant studies. Secondly, with consideration of the heterogeneity in primary studies designs in each review, different types of interventions, outcomes, duration and measures restricted to the potential synthesis of the findings from different reviews and to directly compare the effectiveness of different intervention types.

3.6.4 Implications of the Findings for Policy Makers and Schools

The findings of this umbrella review have demonstrated that some interventions were promising in increasing PA levels in school children and adolescents such as TDM, ABs, active desks, and multi-component interventions. Other interventions such as multi-component interventions concerned with PA, nutrition and education shown a potential to increase PA and decrease BMI. Although some effective programmes were identified, it may be argued that not every effective program can be universally applied across all global settings. Therefore, it is crucial for future research to focus on enhancing the quality of evidence and broadening the context for implementation. Additionally, there is a need for more studies featuring rigorous primary study designs, such as comprehensive RCTs, with adequate sample sizes, appropriate control groups, suitable follow-up periods extending well beyond the post-intervention phase, and the inclusion of validated measures of PA, alongside an evaluation of sustainability issues.

3.6.5 Conclusion

This review examined the efficacy of school-based interventions aimed at enhancing PA among school-aged children internationally. Initiatives like TDM, ABs, and active desks have shown promise in positively influencing PA levels. Additionally, interventions that incorporate multiple components have been found to effectively reduce BMI. The value of

sustained, theoretically grounded programmes in promoting PA has been reinforced by our findings. Nonetheless, the variable quality of the studies reviewed makes it difficult to draw definitive conclusions. It is evident that further, more rigorously conducted research is required to conclusively determine the impact of these interventions. This underscores the necessity for future studies to adhere to stringent methodological standards to enhance the reliability of evidence in this field.

The subsequent chapter will present a systematic review focusing on interventions in Middle Eastern and Arabic-speaking countries, aiming to identify the most effective interventions to increase PA among schoolchildren in these regions. The rationale for including other Arabic-speaking countries in this review rather than limiting the review to evidence from studies undertaken in KSA stems from a notable gap in published studies in KSA, prompting the researcher to extend the review to include countries with similar climatic conditions, educational systems, and cultural practices. This broader approach aims to uncover insights into what interventions may or may not be effective in KSA schools.

Chapter Four: Systematic Review of Evidence for the Effectiveness of School-based PA Interventions in the Middle East and Arabic-speaking Countries

4.1 Introduction

This chapter presents a review of primary studies focusing on school-based PA interventions aimed at promoting PA among schoolchildren aged six to 18 years in Middle Eastern and Arabic-speaking countries. It introduces the methodology and provides an overview of how the systematic review was conducted. The search strategy adopted for this research, the inclusion criteria for selecting the literature, and the search strategy will also be detailed. Finally, the chapter will present the search results, followed by a discussion and the conclusion.

4.2 Inclusion of Countries and Acknowledgement of Diversity

This systematic review focuses on school-based PA interventions in Middle Eastern and Arabic-speaking countries, encompassing both members of the League of Arab States (Blair et al., 2014) and neighboring countries in the Middle East that do not primarily speak Arabic, such as Iran, Israel, Turkey, and Cyprus. The inclusion of these countries is justified based on their shared geographical, cultural, and socio-political contexts, which significantly influence PA behaviours among school-aged children. By including a broader range of countries from this region, the review seeks to capture the diverse factors that impact the effectiveness of PA interventions

The countries selected for this review represent a wide array of cultural, socioeconomic, and political backgrounds. This diversity is essential for understanding the varied challenges and opportunities in implementing school-based PA interventions across different settings. For instance, while countries like KSA and the United Arab Emirates possess substantial economic resources that can facilitate large-scale public health

initiatives, countries like Sudan and Morocco face more significant economic constraints, which may limit the scope and effectiveness of similar interventions (Blair et al., 2014).

Moreover, the political contexts across the region vary widely, from stable monarchies, such as KSA, to countries experiencing ongoing conflict, such as Syria and Yemen, which can significantly influence the feasibility and effectiveness of school-based interventions (Anderson, 2017). In KSA, for example, the stability of the government allows for the implementation of long-term public health strategies, including school-based PA interventions. However, this stability also comes with unique challenges, such as navigating conservative cultural norms that may impact the design and acceptance of such interventions.

The diversity in public health challenges is also notable. In KSA and other GCC countries, there is a higher prevalence of NCDs linked to inactivity, such as obesity and diabetes, largely due to rapid urbanisation and lifestyle changes. In contrast, countries like Sudan face different public health priorities, including infectious diseases and malnutrition, which may take precedence over PA initiatives (Mokdad et al., 2014). Therefore, this review not only compares interventions within a shared linguistic and cultural framework but also takes into account the diverse contexts in which these interventions are implemented. By doing so, the review aims to provide insights that are both regionally relevant and adaptable to the varied conditions across Middle Eastern and Arabic-speaking countries.

4.3 Study Aim and Objectives

The aim of this study was to conduct a systematic review of studies focusing on Middle Eastern and Arabic-speaking countries to determine the most effective interventions for promoting PA among schoolchildren aged six to 18 years. To achieve this aim, the systematic review addresses the following research questions:

1. What is the effectiveness, feasibility and acceptability of school-based interventions in increasing PA among children and young people aged six to 18 years in Middle Eastern and Arabic-speaking countries?
2. What are the key components required in a school-based intervention programme to increase PA among this target population?
3. Are there particular combinations or components of school-based programmes that are more effective than others in increasing PA among this target population?

4.4 Methods

A systematic literature search and narrative synthesis was undertaken to identify, evaluate and synthesise relevant evidence from intervention studies undertaken in a school setting in Middle Eastern and Arabic-speaking countries. This review adhered to PRISMA guidelines for conducting systematic reviews. The protocol was registered in the PROSPERO International Prospective Register of Systematic Reviews (registration number: CRD42021260738).

4.4.1 Formulation of Research Question

The PICO framework was considered to formulate the aim of this study by describing the population (P), intervention (I), comparison (C) and outcome (O), as summarised in Table 4.1 below. The value of the PICO framework is that it breaks down complex questions into simpler phrases that also form the inclusion and exclusion criteria (Fenton & Baxter, 2016).

Table 4.1: PICO Framework

Population	School children and young people aged 6–18 years old in Middle Eastern and Arabic-speaking countries.
Intervention	School-based PA as either a primary intervention or a component of a multi-behavioural intervention.

Comparison	No intervention or usual school provision of PA.
Outcome	Self-reported or objectively measured change in PA levels.

4.4.2 Inclusion and Exclusion Criteria

Ideally, including a large body of evidence is beneficial as it provides a more extensive basis for analysis and decision-making (Harris et al., 2014). Therefore, the following inclusion and exclusion criteria were applied to select the most appropriate articles for inclusion in the review.

Table 4.2: Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Studies that focused on PA/inactivity among children and young people aged six to 18 years in Middle Eastern and Arabic-speaking countries located in the Arabian Peninsula, northern parts of Africa, and the East Mediterranean. It contains 22 countries (i.e., Yemen, United Arab Emirates, Syria, Saudi Arabia, Qatar, Oman, Lebanon, Kuwait, Jordan, Bahrain, Palestinian, Tunisia, Egypt, Libya, Morocco, Comoros, Djibouti, Mauritania, Algeria, Sudan, Somalia, and Iraq). These countries are defined as the 22 member countries of the League of Arab States (Blair et al., 2014); along with countries in the Middle East that are not counted in the Arabic-speaking countries (i.e., Iran, Israel, Turkey and Cyprus).	Studies that did not focus on PA/inactivity among children and young people in Middle Eastern and Arabic-speaking nations
Studies that explored at least one intervention for increasing PA among the targeted population.	Studies that did not explore at least one intervention for increasing PA among the target population
Studies published after the year 2000	Studies published earlier than the year 2000

Peer-reviewed articles	Non-peer-reviewed articles
Studies published in English or Arabic language	Studies published in languages other than English or Arabic
School-based interventions	Interventions not based in school and any study targeted specific populations based on BMI or other risk factors for obesity

4.4.3 Literature Search Process

Systematic searches were conducted in PubMed/MEDLINE, Web of Science, Scopus and CINAHL. These databases were chosen not only because they are easily accessible but also because they contain a large volume of empirical and peer-reviewed articles, due to their public health scope. In line with the PICO questions and the inclusion and exclusion criteria, the researcher derived the keywords by applying the Medical Subject Heading (MeSH). The Boolean operators “OR” and “AND” were used to, respectively, broaden and combine/narrow the search. On the one hand, the “OR” operator separated the different keyword groups while, on the other hand, the “AND” operator merged the key phrases with their synonyms.

The search strategy employed the following keywords: (“School-based intervention*” OR School* OR “School-based program*” OR “School-based”) AND (“Exercise*” OR “Physical activit*” OR “physical exercise” OR “Aerobic Exercise”) AND (“child*” OR “Adolescent*” OR Teen* OR “Young people” OR Youth) AND

(Yemen OR United Arab Emirates OR Syria OR Saudi Arabia OR Qatar OR Oman OR Lebanon OR Kuwait OR Jordan OR Bahrain OR Palestinian OR Tunisia OR Egypt OR Libya OR Morocco OR Comoros OR Djibouti OR Mauritania OR Algeria OR Sudan OR Somalia OR Iraq OR Israel OR Iran OR Turkey OR Cyprus). The search parameters were

limited to English and Arabic language publications published between January 2000 and January 2023.

4.4.4 Selection of Studies

All records were exported to Mendeley reference manager software. Duplicate records and all studies whose titles did not meet the inclusion were excluded. Screening of studies was conducted by two reviewers independently (AA and LB), titles and abstracts of records retrieved from searches were screened for inclusion by two of them, and any disagreement was resolved by discussion with a third reviewer (EG).

4.4.5 Data Extraction

A standardised approach was used to extract data from the selected studies, as recommended by Moher et al. (2015), including study details (author, year of publication and the country where the study was conducted), sample description (i.e. sample size, age, sex), interventions (i.e. PA component, the combination of PA components), intervention duration, frequency of the intervention, outcomes measured, implementers and study results. Furthermore, in order for the reader to understand the significance of the findings in every paper that was reviewed, the p values and confidence intervals were also extracted. Some quantitative data were also summarised such as total population sample, percentages of effectiveness, etc. More details about data synthesis can be found in the results section of this chapter.

4.4.6 Risk of Bias Analysis

Two critical appraisal tools were used to assess the risk of bias within the studies included in this review (the CASP RCT Checklist and the Joanna Briggs Institute (JBI) Quasi-Experimental Studies Tool (Sterne et al., 2019; Tufanaru et al., 2017). The assessment aimed to clearly understand the studies' strengths, weaknesses, and limitations, particularly regarding study design and choice of outcome measures.

4.4.7 Data Synthesis

Due to the heterogeneous nature of the interventions and outcome measures, a meta-analysis approach to the retrieved studies was considered inappropriate. The effectiveness of the PA intervention was assessed by comparing the differences between the intervention groups and control groups immediately after the intervention and during the follow-up periods. The following subcategories were analysed: (1) effectiveness of the PA intervention, (2) key components in the PA intervention and (3) combinations of school-based programmes and their effectiveness on PA.

4.5 Results

This results section contains four main parts: the search outcome, data extraction, risk of bias appraisal, and data synthesis.

4.5.1 Search Outcome

The original search was conducted in January 2023 and a follow-up literature search was conducted from January 2023 onwards, using the same databases and search terms as the original search. This additional search did not identify any new studies that met the inclusion criteria. The initial literature search produced a total of 1526 studies. The total number was 1526: PubMed/MEDLINE 399, Web of Science 767, Scopus 7 and CINAHL 353. There were 186 duplicates, and after their exclusion, the 1340 remaining records' titles and abstracts were screened against the inclusion and exclusion criteria of the systematic review. The full texts of the remaining 44 studies were screened which led to the exclusion of 36 studies due to such reasons as (1) having an inappropriate target population; (2) being protocols; (3) having inappropriate designs; and (4) inappropriate interventions (for more details about 36 studies with reasons for excluding each one can be found in appendix 3) Further articles (n = 9) were identified from reference lists. A PRISMA flow diagram shows

the search results and further illustrates the selection process, including screening, eligibility, and inclusion of studies presented below:

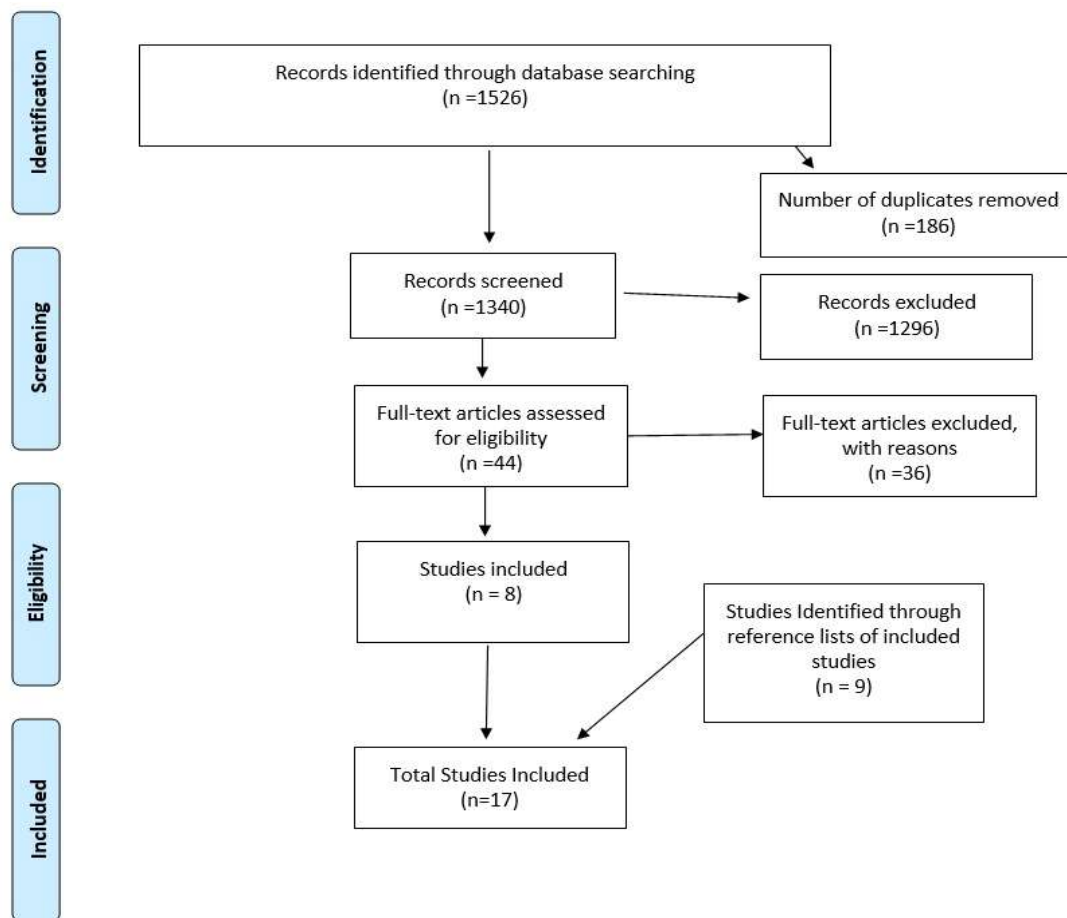


Figure 4.1: PRISMA Flow Diagram

4.5.2 Study Characteristics

Study characteristics are summarised in Table 4.3 below. The designs of the 17 studies were quasi-experimental, i.e., non-RCTs (four studies) (Maatoug et al., 2013; Maatoug et al., 2015; Ghamman et al., 2017; Elfaki et al., 2020) or RCTs (13 studies) (Taymoori & Lubans, 2008; El Ansari et al., 2010; Saffari et al., 2013; Habib-Mourad et al., 2014; Darabi et al., 2017; Rostami-Moez et al., 2017; Simbar et al., 2017; Stanley et al., 2017; Habib-Mourad et al., 2020; Habib-Mourad et al., 2020a; Kutbi et al., 2019; Allafi, 2020; Bahathig & Saad, 2022). Studies were conducted in only seven countries, with no studies from the majority

of the Middle East and North Africa (MENA) countries. Three studies were carried out in Tunisia (Maatoug et al., 2013; Maatoug et al., 2015; Ghamman et al., 2017), five studies in Iran (Taymoori & Lubans, 2008; Saffari et al., 2013; Darabi et al., 2017; Rostami-Moez et al., 2017; Simbar et al., 2017), three studies in Lebanon (Habib-Mourad et al., 2014; Habib-Mourad et al., 2020; Habib-Mourad et al., 2020a), three studies in KSA (Kutbi et al., 2019; Elfaki et al., 2020; Bahathig & Saad, 2022), one study in Egypt (El Ansari et al., 2010), one study in Kuwait (Allafi, 2020), and one study in the United Arab Emirates (UAE) (Stanley et al., 2017). In contrast, no studies met the inclusion criteria for the remaining countries in the region (Yemen, Turkey, Syria, Qatar, Oman, Jordan, Israel, Bahrain, the Palestinian territories, Morocco, Algeria and Libya).

Only five studies included fewer than 200 participants: Simbar et al. (2017) with 80 participants, Bahathig & Saad (2022) with 138 participants, Kutbi et al. (2019) with 148 participants, Saffari et al. (2013) with 160 participants, and Taymoori & Lubans (2008) with 166 participants. Conversely, four studies had more than 1,000 participants: Maatoug et al. (2013), Maatoug et al. (2015), Ghamman et al. (2017), and Habib-Mourad et al. (2020). All studies focused on school-aged children, targeting age ranges from 8 years (Habib-Mourad et al., 2020) to 16 years (Maatoug et al., 2013; Maatoug et al., 2015).

Calculating the overall mean age of the 15,413 participants represented in the 17 studies was challenging due to the unavailability of individual participant data. Among these studies, 10 included both male and female adolescent students. Six studies exclusively focused on girls (Elfaki et al., 2020; Taymoori & Lubans, 2008; Darabi et al., 2017; Rostami-Moez et al., 2017; Simbar et al., 2017; Bahathig & Saad, 2022), and one study focused on boys (Kutbi et al., 2019).

Most interventions identified were multi-component, integrating aspects of lifestyle, diet, and education, with a few focusing exclusively on PA interventions, such as exercise

combined with education about PA/exercise. Some studies complemented their exercise interventions with various complementary elements. For instance, Maatoug et al. (2013; 2015), Ghammam et al. (2017), and Rostami-Moez et al. (2017) incorporated a healthy eating programme. Habib-Mourad et al. (2020a) introduced an education programme aimed at improving dietary behaviours, while Saffair et al. (2013) focused solely on educational interventions. Habib-Mourad et al. (2020) employed an active lifestyle approach based on social cognitive theory. The health-E-PALS program, combining class curriculum, family involvement, and food service improvements, was utilized by Habib-Mourad et al. (2014). Skill-based health education was the focus of Simbar et al. (2017), and Stanley et al. (2017) conducted workshops for health education interventions on tobacco and nutrition. Additionally, Taymoori & Lubans (2008) offered individual counseling, and Darabi et al. (2017) provided educational booklets based on the theory of planned behaviour.

All 17 studies specified their intervention periods, with the exception of two studies (Simbar et al., 2017; Stanley et al., 2017); the durations ranged from six weeks (Allafi, 2020) to three years (Maatoug et al., 2015; Ghamman et al., 2017). Seven studies employed usual practice (or no PA programme) as their control intervention, including Maatoug et al. (2013); Maatoug et al. (2015), Ghamman et al. (2017), Elfaki et al. (2020), Habib-Mourad et al. (2020a), Bahathig & Saad (2022), and Allafi (2020). Five studies did not specify their comparison elements, but it can be assumed that they involved a comparison with no PA modification program (Saffari et al., 2013; Habib-Mourad et al., 2014; Rostami-Moez et al., 2017; Simbar et al., 2017; Habib-Mourad et al., 2020). Four studies designated PA and PA education only as the control, since the intervention groups combined physical activities with additional measures, including nutrition classes for children, parents, and teachers, among other initiatives (Taymoori & Lubans, 2008; El Ansari et al., 2010; Darabi et al., 2017; Kutbi et al., 2019). Lastly, one study employed a tobacco workshop as its control (Stanley et al., 2017).

Table 4.3. Summary of the Included Studies

Study, Year and Country	Study design	Sample size (N)	Gender & Age	Type of Intervention	Length of Intervention & Follow up	Intervention Components	Outcomes Measured	Study Results
Maatoug et al., 2015 Tunisia	Quasi-Experimental Intervention Study (Non-RCT)	4003 IG 1929 CG 2074	Both (11 to 16 y)	PA and healthy eating programme.	Three years No follow-up	Educational lessons on PA + how it can be incorporated into daily exercises (one hour for three days per week) Peer education through training of student leaders.	PA standardised pretested questionnaire.	Increase in normal weight (P= .03) Decrease in overweight (P=.03)
Maatoug et al., 2013 Tunisia	Quasi-Experimental Intervention Study (Non-RCT)	2200 IG 1247 CG1091	Both (12 to 16 y)	PA and healthy eating programme.	One school year. Follow-up after one year.	The intervention contained interactive lessons and activities that were delivered by pre-formed teachers with the collaboration of the doctor members of the project.	Behaviours Knowledge PA and dietary habits intentions.	Significant increase in both knowledge and behaviour intentions in intervention group (P < .01).
Stanley et al., 2017 UAE	RCT	394	Both mean ages 13.9 y.	Workshops for health education intervention on tobacco, nutrition and PA.	Not stated	Workshop focuses on health education for PA, nutrition and tobacco.	Attitudes, knowledge, and perceptions.	No change at all in measured parameters. Only change after tobacco workshops.

Study, Year and Country	Study design	Sample size (N)	Gender & Age	Type of Intervention	Length of Intervention & Follow up	Intervention Components	Outcomes Measured	Study Results
Simbar et al., 2017 Iran	RCT	80 IG 80 CG 80	Girls (14 to 18 y)	Educational sessions for PA and healthy eating	Not specified how long the intervention Two-month follow-up	15-minute role-play, followed by a 15-minute small group discussion on the benefits of regular PA. 15-minute game-playing exercise then followed by a 15-minute problem-solving exercise	Questionnaire to evaluate PA related attitudes, knowledge and behaviour.	A significant increase in knowledge and behaviour but not in the attitude in the intervention group
Kutbi et al., 2019 KSA	c-RCT	148 IG 79 CG 69	Male students (10 to 15 y)	Educational programme	2 months 2 months follow-up	60 minutes session in health education for 2 weeks 2 weeks of group counselling A presentation about healthy diet	PA frequencies (e.g., running, walking, cycling, days/week, how much time spent in sedentary behaviours.	No statistically significant differences in total METs between the intervention group (2098.41±1922.67) and the control group (2216.46 ± 1816.03), P>0.05
Saffari et al., 2013 Iran	RCT	365 IG 186 CG 179	Both (14 to 18 y)	Educational sessions for PA and healthy eating	Three months and three months follow-up	Healthy lifestyle course consisting of six sessions over three weeks.	The Adolescent Lifestyle Questionnaire	The boys had greater levels of PA than girls. Girls have more social support than boys

Study, Year and Country	Study design	Sample size (N)	Gender & Age	Type of Intervention	Length of Intervention & Follow up	Intervention Components	Outcomes Measured	Study Results
Habib-Mourad et al., 2020a Lebanon	RCT	1013 IG 701 CG 312	Both (9 to 11 y)	Focused on dietary behaviours and PA.	One year No follow up	Three modules coordinated the intervention, 12 fun and interactive classroom sessions, the family module includes meetings, health fairs, and recipes, and samples sent home as part of the information packets and the intervention involved eating at school shops and using lunch boxes sent by families	Knowledge Self-efficacy PA and dietary behaviours	Significant increase in knowledge and self-efficacy in the intervention group but PA didn't improve.
Habib-Mourad et al., 2020 Lebanon	RCT	806 IG 457 CG 349	Both (8 to 12 y)	Focused on the promotion of healthy eating and an active lifestyle based on social cognitive theory.	Two-year intervention program followed by a one-year washout period.	Two consecutive academic years: Twelve nutrition education interactive activities were delivered in the classroom during the first academic year, and six complimentary activities were delivered during the next 8 months.	Pre-and post-assessment anthropometric measurements and questionnaires about PA and eating habits.	Significance increases in PA after school in the intervention group compared to the control group after one-year follow-up. (P=0.044)

Study, Year and Country	Study design	Sample size (N)	Gender & Age	Type of Intervention	Length of Intervention & Follow up	Intervention Components	Outcomes Measured	Study Results
Habib-Mourad et al., 2014 Lebanon	RCT	363 IG 188 CG 175	Both (9 to 11 y)	Multi-component intervention programme focuses on PA and eating.	Three months No follow up	The intervention is called “Kanz al Soha” in Arabic language, which means the treasure of health—focusing on PA and diet.	WC BMI Knowledge PA and dietary habits	There is no significant difference in PA and screen time nor in BMI. Highly accepted programme. Significant increase in self-efficacy and knowledge.
El Ansari et al., 2010 Egypt	RCT	160 IG 80 CG 80 35 boys 45 girls	Both Mean age 15.7	PA intervention	Three months and conducted after school hours. No follow up	One hour, three times a week. Outdoor activities such as football, volleyball, handball, basketball, cycling and walking. Indoor activities: table tennis, gym, aerobic dance, and aerobic boxing.	Primary outcome: change in PA. Secondary outcome: change in the anthropometric (BMI, weight, % of body fat).	The weight increased by 37.3% in the control group and decreased by 12.5% after three months in the intervention group.

Study, Year and Country	Study design	Sample size (N)	Gender & Age	Type of Intervention	Length of Intervention & Follow up	Intervention Components	Outcomes Measured	Study Results
Ghammam et al., 2017 Tunisia	Quasi-Experimental Intervention Study (Non-RCT)	4003	Both (11 to 16 y)	PA educational programme	Three-year intervention One year follow up	Three events each year to teach children, parents, and teachers about healthy eating and PA. Interactive lessons about healthy eating, the benefits of regular PA, and how to incorporate PA into daily life.	PA habits and smoking habits. BMI Vegetables and Fruits consumption.	Significance decreases in the students who did PA in the intervention group. (Maybe because the matter of the Tunisian Revolution that happened in the middle of the project) (P=.01, P=.001)
Taymoori & Lubans (2008) Iran	RCT	166	Girls Grades 9 and 10	Educational sessions for PA and two PA sessions	Six months Follow-up phone calls to support behaviour change	Each session was 45 to 60 minutes. Lectures, role-playing, slides, reminder cards, PA planning, and handouts.	Self-reported PA	Significance increases in PA through changes in the theoretical constructs.
Elfaki et al., 2020 KSA	Quasi-Experimental study	565	Girls (12-15 y)	Educational sessions for PA and healthy eating	6 months No follow-up	Health education sessions for PA and eating, lectures, discussion, games and role-playing.	Self-reported PA Anthropometric measurement.	Significant improvement in PA

Study, Year and Country	Study design	Sample size (N)	Gender & Age	Type of Intervention	Length of Intervention & Follow up	Intervention Components	Outcomes Measured	Study Results
Rostami-Moez et al., 2017 Iran	RCT	344 IG 179 CG 165	Girls 7th-grade	Educational sessions for PA and healthy eating	Intervention for two months and follow-up for six months	60 minutes of training per week for two months (8 hours total) in the field of PA pyramids. Several methods were employed, including lectures, group discussions, posters (PA pyramid), and pamphlets	Self-reported PA	Significance increases in PA in the intervention group from 2.50 to 3.17
Darabi et al., 2017 Iran	RCT	578 IG 289 CG 289	Girls (12 to 16 y)	Educational sessions for PA and healthy eating	6 months 6 months follow-up	90 minutes for group discussions. Sessions contain lectures, role play, slides, and educational pamphlets.	Questionnaire to evaluate PA related attitudes, knowledge, Subjective norm Behaviour intention	A significant increase in the intervention group compared to the control group (p<0.001)
Bahathig & Saad (2022) KSA	c-RCT	138 IG= 68 CG= 70	Girls (13-14 y)	Educational intervention	3 months 3 months follow up	60-minute seminar for the mothers of girls before the education. Six educational sessions on nutrition, PA and BMI throughout the year.	Self-reported PA, SB and body Image Satisfaction	There was no significant change in BMI but there are immediate significant improvements in PA and SB

Study, Year and Country	Study design	Sample size (N)	Gender & Age	Type of Intervention	Length of Intervention & Follow up	Intervention Components	Outcomes Measured	Study Results
Allafi 2020 Kuwait	RCT	225 110 boys 15 girls	Both (9-11 y)	PA intervention	6 weeks 6 weeks follow-up	Reward for walking, advice on pedometers and incentive of ten stickers if 3000 steps are achieved. 5x50-minute exercise sessions	Steps/day	The feedback and reward group showed significantly higher steps: 3,429 (SD 458), than the feedback group: 2,655 (SD 577) and control group: 2,091 (SD 483). Also, there is no difference between girls and boys.

4.5.3 Behaviour Change Theories

Out of the 17 studies, five reported incorporating a behaviour change theory into their interventions. These included the Social Cognitive Theory (Bandura, 1986) (utilised by Habib-Mourad et al., 2014; Habib-Mourad et al., 2020), the Trans-Theoretical Model (Prochaska & DiClemente, 2005) (employed by Rostami-Moez et al., 2017), the Theory of Planned Behaviour (Ajzen, 1991) (applied by Darabi et al., 2017), and the Health Promotion (HP) Model (Pender et al., 2006) (adopted by Taymoori & Lubans, 2008). The remaining twelve studies did not mention the use of a specific theory or behaviour change model.

4.5.4 Risk of Bias Assessment

The risk of bias assessment revealed that eleven of the thirteen studies classified as RCTs exhibited a low risk of bias. These studies included (Taymoori & Lubans, 2008; El Ansari et al., 2010; Habib-Mourad et al., 2014; Darabi et al., 2017; Rostami-Moez et al., 2017; Simbar et al., 2017; Stanley et al., 2017; Habib-Mourad et al., 2020; Habib-Mourad et al., 2020a; Allafi, 2020; Kutbi et al., 2019; and Bahathig & Saad, 2022). However, one study (Saffair et al., 2013) was classified as having an unclear risk of bias.

Regarding selection bias, it was deemed low across the board, with the exception of one study (Saffair et al., 2013), which did not detail their method for random sequence generation. Conversely, all other thirteen studies adequately applied random sequence generation. The risk of reporting bias, on the other hand, was high as for the thirteen trials blinding was not mentioned in their studies and we can assume blinding was not possible. However, incomplete data were sufficiently accounted for in all thirteen trials.

Selective bias was identified as low in eleven trials, but it remained unclear in two trials (Saffair et al., 2013; Stanley et al., 2017) due to the omission of reported outcomes initially stated to be measured. The detailed checklist used for the risk assessment is available in Appendix 4.

Findings from the risk of bias assessment indicated that three of the four studies classified as quasi-experimental (Maatoug et al., 2013; Ghammam et al., 2017; Elfaki et al., 2020) exhibited a low risk of bias. The remaining study (Maatoug et al., 2015), however, was identified as having an unclear risk of bias. This was because it was unclear whether there were multiple measurements of the outcome for both the pre-and post-test intervention, plus the researchers also failed to specify whether the follow-up was complete and if there were any differences between groups in terms of their follow-up.

All four studies (Maatoug et al., 2013; Maatoug et al., 2015; Ghammam et al., 2017; Elfaki et al., 2020) did not clearly specify whether the outcomes for the participants compared were assessed in a consistent manner. However, it's important to highlight that the outcomes appear reliable, as indicated by the number of raters and the reported intra-rater and inter-rater reliabilities. Furthermore, all studies conducted appropriate statistical analyses to evaluate their findings. The detailed checklist used for the risk assessment is available in Appendix 5.

4.5.5 Data Synthesis

The analysis within the data synthesis was structured around the research questions, focusing on the following main themes: (1) the effectiveness of PA interventions, (2) key components of the PA interventions, and (3) the relationship between programme characteristics and the effectiveness of PA interventions.

4.5.5.1 Effectiveness of the PA Interventions

The evaluation of PA interventions' effectiveness was a primary focus across the included 17 studies. These studies aimed to assess changes in students' PA levels, with a particular emphasis on identifying any increases in activity. The majority of studies, fifteen in total (Maatoug et al., 2013; Maatoug et al., 2015; Ghamman et al., 2017; Elfaki et al., 2020; Bahathig & Saad, 2022; El Ansari et al., 2010; Saffair et al., 2013; Darabi et al., 2017;

Habib-Mourad et al., 2014; Rostami-Moez et al., 2017; Stanley et al., 2017; Simbar et al., 2017; Habib-Mourad et al., 2020; Habib-Mourad et al., 2020a; Kutbi et al., 2019), utilised self-reported surveys to assess changes in PA. These surveys primarily sought to capture students' perceptions of changes in their PA levels, focusing on self-reported increases.

Conversely, two studies (Taymoori & Lubans, 2008; Allafi, 2020) employed pedometers as a means to objectively measure changes in PA. The use of pedometers allowed for more precise quantification of PA, capturing both increases and decreases in activity levels. This objective measurement complements the self-reported data by providing a broader understanding of the interventions' impacts on PA behaviours.

This diverse methodological approach highlights the complexity of measuring PA changes. It emphasises the importance of considering both perceived changes in activity, as reported by participants, and actual changes, as measured by devices like pedometers.

Out of the 17 studies, eleven reported statistically significant increases in PA levels among participants in the intervention groups compared to controls. These eleven studies, encompassing a total of 12,689 students aged between nine and 18 years, demonstrated that interventions could effectively enhance PA levels. However, the study by Stanley et al. (2017) indicated no significant changes in attitudes, knowledge, or perceptions of PA, and Bahathig & Saad (2022) observed no significant improvements in BMI, though there were immediate significant changes in PA, SB, and body image satisfaction among the control group.

Saffair et al. (2013) found that PA levels and social support significantly differed between male and female participants during the intervention, with boys exhibiting higher PA levels and girls receiving more social support. Remarkably, three months post-intervention, both

boys and girls in the intervention group showed statistically significant increases in PA levels compared to the control group.

The study by Simbar et al. (2017) noted changes in knowledge, attitude, and behaviour in both the intervention and comparison groups, although these changes were not statistically significant.

Regarding the magnitude of effect, six studies (Taymoori & Lubans, 2008; El Ansari et al., 2010; Saffair et al., 2013; Rostami-Moez et al., 2017; Allafi, 2020) found that students in the intervention groups were three to six times more likely to engage in PA, both within and outside of school settings, compared to their counterparts in the control groups.

4.5.5.2 Critical Components of the PA Interventions

This review evaluated the components of the PA interventions focusing on the duration of intervention (including follow-up), the time (per day or week) spent on implementing the intervention, and the type of implementation (e.g., theory-based educational lessons on PA or engaging in PA through PE/sports/exercises).

Duration: Two studies (Stanley et al., 2017; Simbar et al., 2017) did not specify the duration of their interventions. For the remaining studies, intervention durations varied from six weeks to three years. Twelve studies (Taymoori & Lubans, 2008; Saffari et al., 2013; Ghammam et al., 2017; Rostami-Moez et al., 2017; Simbar et al., 2017; Maatoug et al., 2013; Allafi, 2020; Kutbi et al., 2019; Bahathig & Saad, 2022; Rostami-Moez et al., 2017; Darabi et al., 2017; Stanley et al., 2017; Habib-Mourad et al., 2020a) detailed their follow-up periods, ranging from two months to one year, whereas clarity was lacking in others regarding follow-up.

Implementation Type: Ten studies adopted theory-based educational lessons (Maatoug et al., 2013; Maatoug et al., 2015; Ghammam et al., 2017; Saffari et al., 2013; Habib-Mourad et al., 2014; Rostami-Moez et al., 2017; Stanley et al., 2017; Habib-Mourad et al., 2020; Habib-Mourad et al., 2020a; Bahathig & Saad, 2022). In contrast, only two studies focused exclusively on engaging in PA (El Ansari et al., 2010; Allafi, 2020), while three studies combined both approaches (Taymoori & Lubans, 2008; Darabi et al., 2017; Simbar et al., 2017). The time allocated per session/day for the interventions was not specified in the five studies (Maatoug et al., 2013; Ghammam et al., 2017; Habib-Mourad et al., 2014; Stanley et al., 2017; Habib-Mourad et al., 2020a).

Time Spent: Where specified, the daily intervention time ranged from 15 to 90 minutes. Studies reporting statistically significant increases in PA levels had interventions lasting not less than three months, some extending up to three years, with at least 60% maintenance in PA levels in long-term interventions (Ghammam et al., 2017; Maatoug et al., 2015). The follow-up periods in these studies varied from six months to one year. Conversely, three studies with up to three months of intervention and follow-up (Saffari et al., 2013; Simbar et al., 2017; Stanley et al., 2017) reported no significant changes, suggesting that shorter durations might be less effective in increasing PA levels among school students.

Intensity: Studies with significant increases in PA levels featured interventions of at least 60 minutes per day (Taymoori & Lubans, 2008; Darabi et al., 2017; Habib-Mourad et al., 2014) or 3 hours per week (El Ansari et al., 2010). In contrast, one study with an insignificant outcome and another reporting no change in PA levels had shorter daily intervention times (Simbar et al., 2017). Saffari et al. (2013) implemented a multifaceted approach consisting of a 15-minute healthy lifestyle course five times a week for six weeks, including role-play, small group discussions, and problem-solving exercises.

4.5.5.3 Intervention Content: PA Interventions

It's important to highlight that the 'implementation type' in the studies conducted by Simbar et al. (2017) and Saffari et al. (2013) consisted of theory-based educational lessons on PA. Apart from these, all other studies employing this type of implementation reported statistically significant improvements in PA levels. Similarly, the two studies that focused solely on engaging in PA, conducted by El Ansari et al. and Allafi, observed a statistically significant increase in PA levels following the intervention ($p < 0.005$), with the intervention group registering statistically higher steps ($3,429 \pm 458$) compared to the control group. Furthermore, two out of three studies that combined educational lessons on PA with actual physical engagement (Taymoori & Lubans, 2008; Darabi et al., 2017) also noted statistically significant enhancements in PA levels post-intervention.

These findings reveal the significance of longer 'time' and 'duration' of interventions in increasing PA levels among school-aged children. In most of the studies, the interventions were delivered by the teachers, but the training that they had was not reported. Other professionals who implemented the programmes included nutritionists and counsellors.

4.5.5.4 Intervention Content: Combined PA and Healthy Eating Interventions

It should be noted that the only combination used alongside PA (educational lessons and exercise) in the reviewed studies was healthy eating, i.e., the improvement of dietary behaviour. The effectiveness of this combination on PA levels was tested in seven studies (Maatoug et al., 2013; Habib-Mourad et al., 2014; Maatoug et al., 2015; Ghammam et al., 2017; Simbar et al., 2017; Stanley et al., 2017; Habib-Mourad et al., 2020a). Two of these seven studies (Simbar et al., 2017; Stanley et al., 2017) reported insignificant increases in the levels of PA when using a combination of different school-based programmes in the intervention groups ($p > 0.05$). Among the remaining five studies, three (Maatoug et al., 2013; Maatoug et al., 2015; Ghammam et al., 2017) had two intervention groups: one where

the intervention was PA alone (both educational lessons and exercise) and the other where the intervention included both PA and a healthy eating programme. In the study by Maatoug et al. (2013), both the PA-only group and the PA and healthy eating group comprised 965 students each. After the intervention, the improvement in PA levels in the PA-only group was 56%, whereas the improvement in the PA and healthy eating group was 67% ($p < 0.005$). The two remaining studies (Habib-Mourad et al., 2014; Habib-Mourad et al., 2020a) also reported statistically significant improvements ($p < 0.05$) in PA levels among the participants in the intervention groups; however, they did not make a direct comparison between a PA-only intervention and a combined PA and healthy eating intervention.

4.6 Discussion

The purpose of this review was to assess the effectiveness of school-based PA interventions in increasing PA among schoolchildren in Middle Eastern and Arabic-speaking countries. Additionally, it aimed to identify the critical components required in school-based intervention to increase PA among this target population. Furthermore, it sought to determine whether specific combinations of elements in school-based programmes are more effective than others in increasing PA. Overall, eleven out of seventeen studies reported statistically significant improvements in the levels of PA among their participants. The studies with a follow-up period longer than three months reported sustained levels of PA. The effect size for the self-reported increase in PA ranged from 58% (Rostami-Moez et al., 2017) to 72% (Taymoori & Lubans, 2008). Although the conditions in the two trials did not substantially vary, there is a noticeable difference in impact, as indicated by the effect sizes.

Furthermore, PA intervention increased participants' knowledge of motor performance by 64% in one study (Darabi et al., 2017). However, the remaining four studies (Simbar et al., 2017; Saffari et al., 2013; Bahathig & Saad, 2022; Stanley et al., 2017) did not report any

statistically significant improvements in PA levels. The lack of effectiveness of this particular programme during its intervention phase may be attributed to its duration of only three months. Levels of PA were likely closely related to factors such as the content and details of the school-based intervention programme. Overall, durations of no less than three months, with an intensity of 60 to 90 minutes per day for at least three days a week, were found to be the most effective. This suggests that programme durations should be no less than three months, with an activity intensity of 60 to 90 minutes per day for at least three days a week. The studies did not report any statistically significant differences when comparing the implementation of programmes between schoolteachers and other professions. However, one study highlighted those schoolteachers, when appropriately trained and equipped with the right skills, resources, and information, can positively influence students' behaviour. They are capable of delivering the intervention with the highest fidelity (Habib-Mourad et al., 2020). Multi-component programmes, those that address PA, health, and diet comprehensively, were shown to ensure students understand the importance of these three factors (Kutbi et al., 2019).

This review suggests that PA for at least 60 minutes per day is necessary for a programme to be effective. In several studies assessing the intensity of PA, including those by El Ansari et al. (2010), Darabi et al. (2017), and Rostami-Moez et al. (2017), the intensity was found to be significantly associated with an increase in MVPA. Rostami-Moez et al. (2017) reported that learners engaged in this level of activity for approximately 30–50% of PE class time. However, greater percentages of MVPA were recorded during break and lunchtimes, in other lessons, and during extracurricular activities. This indicates that while PE classes can be effective in promoting PA, relying on a single lesson alone might not be fully effective. Therefore, schools need to explore additional opportunities for PA at other times.

This review found that most of the programmes that have been evaluated were multi-component (lifestyle, diet, education) and few were focused solely on PA intervention, i.e., exercise and education about PA/exercise. However, there are several global school-based PA interventions developed and implemented in different countries to promote PA in schools that have not been implemented to any extent in Arabic-speaking countries. These interventions, including TDM (Breslin et al., 2023; Hanna et al., 2023), Let's Move (Hankonen et al., 2016), AST (Larouche et al., 2018; Campos-Garzón et al., 2023; Schönbach et al., 2020) which have been very effective in increasing the level of PA, PF and reducing inactive time among schoolchildren.

Likewise, Barbosa Filho et al. (2016) conducted an umbrella systematic review targeting low and middle-income countries. They reviewed fifty reviews and twenty-five studies to synthesise evidence on the effectiveness of PA programmes interventions among children and adolescents aged 6 to 18 years. This umbrella review confirmed that PA interventions could promote PA behaviour among this population. The researchers also concluded that there was strong evidence that school-based PA interventions could positively impact young people's PA levels. Their findings align with other international reviews (Langford et al., 2014; Verstraeten et al., 2012; Biddle et al., 2014; Hoehner et al., 2013). However, it is important to note that due to the unique climatic, social, and cultural factors in Arabic-speaking countries, interventions developed elsewhere are unlikely to be applied directly or without modification to those countries (Pearson et al., 2020).

This review highlights several considerations for the future of PA programmes, aiming to enhance the robustness of PA interventions. Firstly, the number of published studies in Arabic-speaking countries that met the inclusion criteria was seventeen, representing only 30% of Arabic-speaking countries (seven countries). The limited number of studies focusing on this population points to the fact that research into this topic in the region is

still in its infancy. These results are consistent with the findings of Nash et al. (2021), which examined PA interventions exclusively in six GCC countries, and Benajiba et al. (2020), who recently explored interventions to promote PA in Arabic-speaking countries.

Previous systematic reviews and meta-analyses synthesised international evidence for the effectiveness of school-based PA programmes among adolescents as discussed in the previous chapter (Owen et al., 2017; Adom et al., 2020; Vaquero-Solís et al., 2020; Yuksel et al., 2020). One previous review concluded that MV PA can be improved by at least 60 minutes of PE per day when implemented in school curriculums (Yuksel et al., 2020). In these studies, multi-component interventions also had the largest significant effect on PA levels, consistent with the concept of comprehensive school PA programmes (CSPAPs) recommended by the WHO and the Centres for Disease Control and Prevention (CDC) (Vaquero-Solís et al., 2020). Such programmes aim to intervene before children are in school, and when in school through PE and staff involvement.

4.6.1 Limitations of the Evidence Included in the Review

The current review highlights a significant need for more school-based PA intervention studies in the region, as research was found in only seven out of twenty-two countries. Additionally, a predominant reliance on self-reported measures of PA was observed across the studies. While self-reports are a common method for measuring PA levels, they are subject to reporting biases. Specifically, many studies utilised survey instruments or validated questionnaires; however, the absence of objective measurement tools (e.g., accelerometers) means that reported activity levels may not accurately reflect actual behaviours. This is further compounded by the fact that most participants were not blinded to the intervention, introducing a potential for bias as those aware of their participation in an activity-promoting study may report higher levels of PA, consciously or unconsciously, to align with expected outcomes.

The short-term nature of most of the identified studies means there is generally a lack of evidence for the sustainability of PA interventions or the longevity of outcomes. Nonetheless, some of the studies had a long duration and/or follow-up, e.g. up to three years, and the researchers were able to confirm the sustainability of the PA interventions. More research is needed to explore the relationship between sustainability and impacts, or demographic factors such as socioeconomic position and age.

4.6.2 Strengths and Limitations of the Review

The key strength of this review is that it is the first to systematically assess the effectiveness of school-based PA interventions for increasing PA among schoolchildren aged 6 to 18 years old in Middle Eastern and Arabic-speaking countries. We included both Arabic-speaking countries and additional countries in the same region (Iran, Israel, Turkey, and Cyprus) to maximise the number of potentially relevant studies included in the review and increase to generalizability of findings to this wider area. This resulted in the inclusion of five relevant studies conducted in Iran. Other reviews have previously investigated the effectiveness of school-based PA interventions among children and adolescents in Arabic speaking Countries Almutairi et al. (2022) and in six Gulf countries Nash et al. (2021) but this review offered a much more comprehensive narrative synthesis of included articles, adhering to PRISMA guidelines for conducting systematic reviews. However, it also has some limitations. First, publications other than journal articles, ie “grey literature”. such as books, theses, etc., were not included so it is conceivable that additional school-based interventions with unpublished evaluations were excluded. Furthermore, even though numerous other outcomes have been evaluated in regard to PA programmes, this review focused only on the effectiveness of interventions in increasing PA, rather than on other potential associated benefits from the activity.

4.6.3 Implications for Research and Practice

This review demonstrates that some programmes have the potential to increase PA levels in school-aged children. The studies with a follow-up period greater than three months reported sustained PA levels. However, long-term school-based interventions combined with rigorous theoretical and methodological frameworks are necessary to determine the true impact of these interventions on children and adolescents in Arab-speaking countries.

Furthermore, a significant number of studies included in this systematic review were identified through reference searching rather than initial database searches. This highlights a key issue in capturing the full scope of relevant regional evidence. The reliance on reference searching suggests that many pertinent studies may not be adequately indexed or accessible through standard academic databases, potentially due to regional publishing practices, language barriers, or limited dissemination channels.

The implications of this finding are multifaceted. Firstly, it underscores the importance of employing comprehensive search strategies that extend beyond conventional database searches. Reference searching, while labour-intensive, proved crucial in identifying relevant studies that might otherwise have been missed. This approach also highlights the potential gaps in database coverage and the need for researchers to be diligent in exploring all possible sources of information. Therefore, to more accurately capture regional evidence in future research, it is essential to enhance database coverage and include regional and specialised databases that are more reflective of the literature produced within Arabic-speaking countries. For example, databases such as **Arab World Research Source** and **Al Manhal** offer extensive collections of scholarly content related to the Arab world in both Arabic and English. **Dar Al Mandumah** is another key resource, providing access to academic journals, conference proceedings, and theses across various disciplines relevant to the region. Additionally, **Shamaa (Arab Educational Information Network)** is

particularly valuable for educational research, while **AskZad** offers a comprehensive digital library that includes Arabic academic journals, newspapers, and dissertations. Researchers should conduct searches in both Arabic and English and consider grey literature. Improved metadata and abstracts in both local languages and English can enhance discoverability, while collaboration with regional researchers can help identify key studies not widely accessible.

The findings of this systematic review confirm that school-based interventions that attempt to encourage PA among children and adolescents are effective, at least in the short term. These results may provide further support for school-based efforts that aim to enhance students' PA levels, bearing in mind the favourable benefits of PA on health in general. Future studies should be more specific in their reporting of descriptions of control group activities and if they are supplemented or replaced by regular PE sessions. Our results further indicate the need for increased high-quality PA programmes in Arabic-speaking countries in the school environment.; standardised reporting of programme implementation and evaluation would add to the evidence base to support guidance for schools on how best to promote PA. It is necessary to better understand both the mechanisms of action and the assessment of the implementation process to have a deeper understanding of how these types of interventions operate and how they may be implemented in practice.

4.6.4 Conclusion

This review adds to the existing body of research about the efficacy of school-based interventions to increase participation in PA. To date, a limited range of types of programmes have been evaluated in Arabic-speaking countries, which focus solely on assessing PA-specific interventions. Most of the interventions evaluated were multi-component (including education components on lifestyle, and diet, education). Long-term school-based interventions combined with rigorous theoretical and methodological

frameworks are necessary to develop, implement and evaluate PA interventions for children and adolescents in Arabic-speaking countries. Future work in this area must also consider the complex systems and agents by which PA is influenced and whether programmes that have been effective in other regions could be adapted for the Arabic-speaking region.

While there is a significant body of international research on school-based PA interventions aimed at increasing PA rates among students as discussed in the previous chapter, there remains a notable scarcity of such studies within Arabic countries, especially KSA. This discrepancy points to a pronounced gap in evaluating the effectiveness of these interventions through rigorous RCTs in the Kingdom. The necessity for such studies is paramount to understanding the impact of current programmes and to inform the development of new interventions that are tailored to the cultural and social specifics of the region. Furthermore, this oversight extends to the evaluation of various widely recognised and potentially promising PA programmes identified in the umbrella review (see Chapter Three). Programmes like TDM, ABs, and the use of standing desks, despite their international acclaim and adoption, have not been systematically assessed in the context of Arabic countries. This lack underscores a significant opportunity to explore the adaptability and effectiveness of these initiatives in a new cultural setting.

The absence of evaluations for these programmes not only highlights a gap in the literature but also suggests potential barriers to implementing such initiatives in Arabic countries. This situation calls for a deeper investigation into the facilitators and barriers to adopting international PA programmes within these nations. Understanding these barriers and facilitators is crucial for designing interventions that are both effective and culturally congruent, thereby ensuring their success and sustainability in increasing PA among students in Arabic countries. Therefore, this review highlights an equally important need for qualitative research aimed at exploring the barriers and enablers of PA in KSA schools.

Before the implementation and evaluation of new programmes, it is vital to gain a deep understanding of the context-specific factors that affect their feasibility and acceptability. This foundational knowledge will ensure that interventions are not only designed to be culturally and contextually relevant but also stand a higher chance of being effective. By addressing both these critical areas of research, we can significantly enhance the potential for successful PA interventions in KSA.

Chapter Five: Exploring PA Promotion in the School Setting: Methods

5.1 Introduction

This chapter describes the methods of the qualitative study, and it begins with an overview of the research methodology, followed by the philosophical paradigm that guides this research and a detailed rationale for the selection of specific methods. The chapter then presents the research design, highlighting the qualitative methods employed and discussing various elements integral to this approach. Additionally, data collection methods, including semi-structured interviews and workshops, are thoroughly described. This includes an outline of the criteria for participant selection, the purposive sampling technique used, and the ethical considerations adhered to, along with translation techniques for data. The chapter proceeds to detail the data analysis procedures, with thematic analysis highlighted as the primary method for analysing interview and workshop transcripts.

Then the chapter discuss the reliability, credibility, and dependability of the qualitative research data. Finally, the chapter concludes with an explanation of the engagement in public involvement prior to the commencement of the main study which is provided to underscore its importance in the research process.

5.2 The Rationale for this Study

The previous two chapters (see Chapters Three and Four) evaluated existing literature on the effectiveness of school-based interventions aimed at increasing PA levels among school children aged 6 to 18 years globally and in the Middle East and Arabic-speaking countries specifically. Based on the findings from both reviews, it was clear that there is a large number of international studies on school-based PA interventions for increasing the rates of PA among students, but fewer studies are focusing on Arabic countries and, in particular,

KSA. Therefore, this study proposed to reduce this research gap by undertaking primary research, to explore the barriers and enablers of PA with stakeholders in KSA schools.

5.3 Study Aim and Objectives

The overall aim of this study was to explore with stakeholders the challenges and opportunities for school PA and produce key recommendations to inform the development of interventions among schoolboys aged 13 to 15 years old from Jeddah City, KSA. In order to achieve this aim, this study was guided by the following specific objectives:

1. To explore the perspectives of school staff and parents on the barriers to and enablers of school-based PA among male students aged 13 to 15 years in Jeddah City.
2. To explore the perspectives of school male students aged between 13 to 15 years in Jeddah City and to generate participant-recommended strategies for school-based PA to increase PA.
3. To explore the factors that might influence the implementation of interventions aimed at increasing PA in Saudi schools.

5.4 The Setting

The geographical location of a qualitative study is vital in comprehending the cultural and contextual factors that shape research findings. This study was conducted in Jeddah city, KSA, focusing on two schools that represent contrasting socio-economic environments. The first was a private school located in an affluent area, and the second was a public school located in a deprived area. This selection provided a comparative perspective on how socio-economic factors influence PA among schoolboys' children (see Figure 5.1).

The rationale for selecting Jeddah City was based on several factors, including its population size, economic significance, and globalisation status (Al Habib, 2021). Furthermore, Jeddah City is the second biggest city in KSA, and it is characterised as a

liberal city with a diverse and multicultural population (Al Habib, 2021). The selection of the two schools in Jeddah City was strategic and aimed to capture a broad range of lifestyle influences.

Previous studies have not addressed the enablers to and barriers for school PA among schoolboys' children in KSA as discussed in Chapter Four. Therefore, conducting this study in Jeddah City offers a distinct chance to gain insights into the experiences of school staff members, male students and parents in a cultural and contextual setting that has not been previously explored. By exploring the experiences of school staff members, parents and male students in Jeddah City, this study can shed light on the broader cultural and contextual factors that influence school-based PA in KSA.



Figure 5.1- Map of the KSA shows Jeddah City.

5.5 Overview of the Methodology

The current study adopted the Saunders et al. (2009) framework, commonly known as the Onion model, to guide the methodological approach employed to explore the perspectives of school staff members, parents, and male students on the barriers to and enablers of school-based PA. The Onion model comprises several nested layers, each of which directs a vital phase of the methodological approach. The outer layer of the Onion model denotes the research philosophy, which in this study was interpretivism (Bryman, 2016; Ryan, 2018). Interpretivism was deemed appropriate for exploring the subjective experiences and perspectives of school staff members, parents and male students regarding school-based PA, as it emphasises the importance of understanding human behaviour and the meanings that individuals attach to their experiences (Creswell, 2013). Moving inwards, the fifth inner layer of the Onion model denotes the research approach, which was an inductive approach (Denzin & Lincoln, 2017). An inductive approach was deemed suitable for this study as it allowed for the exploration and generation of new insights and ideas regarding school-based PA among male students aged 13 to 15 years in Jeddah City, KSA.

The fourth inner layer of the Onion model represented the research strategy, which was assigned to guide this study in the form of a case study. A case study approach was deemed appropriate as it enabled a detailed and contextualized exploration of the barriers to and enablers of PA among male students aged 13 to 15 years in Jeddah City. Moving inward, the third inner layer of the Onion model represented the research method, which was qualitative (inductive). The qualitative (inductive) approach was deemed appropriate as it allowed for the exploration of school staff members' subjective experiences and perspectives regarding school-based PA, which was the primary objective of this study. The second inner layer of the Onion model represented the time horizons layer, which was a short period of time (cross-sectional). The cross-sectional approach was chosen as it allowed for the collection of data from a diverse range of school staff members, parents and

male students within a relatively short period. This approach facilitated the capture of a snapshot of the participant's experiences and perspectives at a particular point in time.

The innermost layer of the Onion model represents the data collection method used, which in this study was semi-structured interviews and workshops. The data analysis technique employed was thematic analysis (TA). Thematic analysis was deemed appropriate as it allowed for the identification and exploration of common themes and patterns within the data collected from the semi-structured interviews and workshops (Braun & Clarke, 2006). In conclusion, the Onion model was deemed suitable for guiding the methodological approach employed in this study. The study aimed to explore the perspectives of school staff members, parents and male students on the barriers to and enablers of school-based PA among male students aged 13 to 15 years in Jeddah City. Through the use of qualitative data collection methods and thematic analysis, this study aimed to provide a rich and detailed exploration of this topic and contribute to the development of effective interventions aimed at increasing school-based PA among male students in Jeddah City. Overall, the Onion model provided a framework for guiding the study's methodological approach, enabling a comprehensive exploration of the research questions.

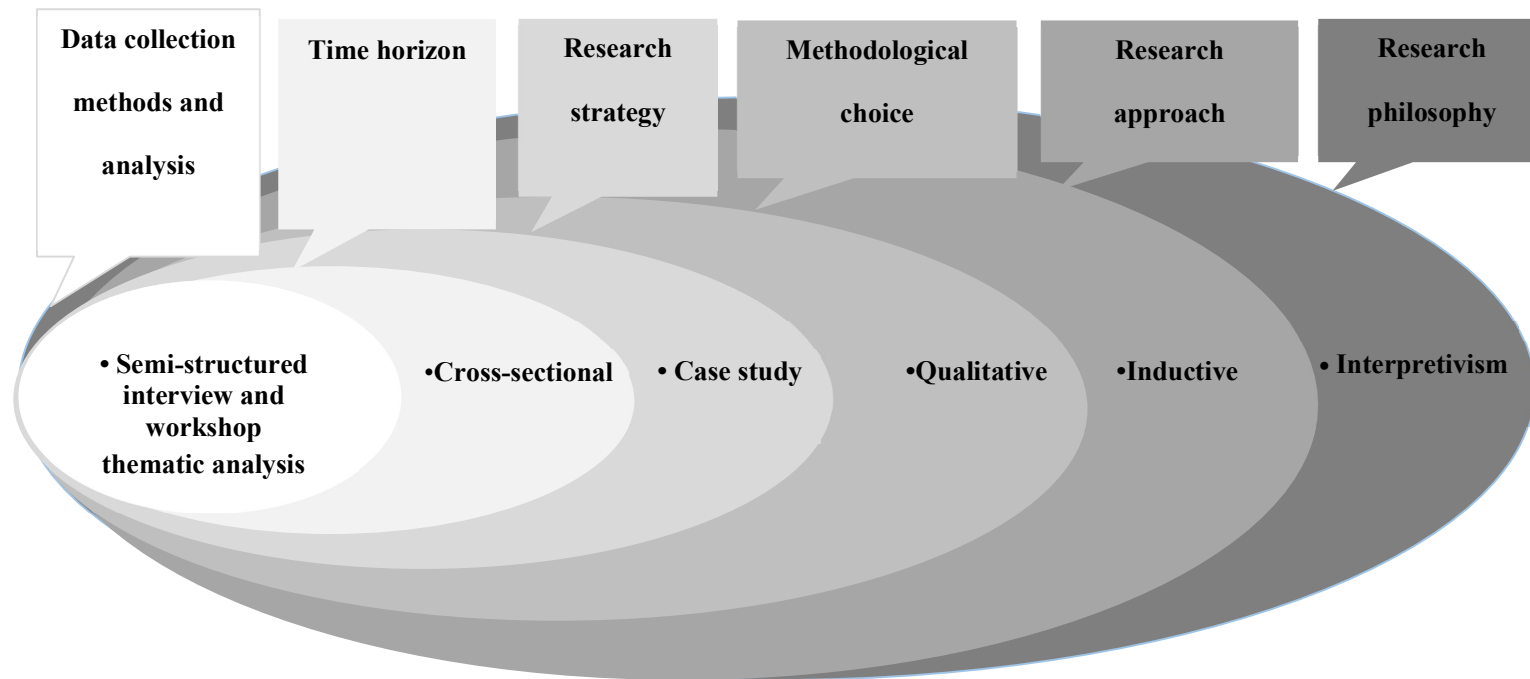


Figure 5.2 depicts the comprehensive range of methodological strategies employed in the present qualitative study, utilising the Onion Model as a framework. (Source: Saunders et al., (2009)).

5.6 Philosophical Stance

In this study, the selection of a philosophical approach was a crucial aspect of the research design. As stated by Bryman (2016) and Ryan (2018), there are three primary paradigms widely used in the health sciences: positivism/post-positivism, interpretivism/constructivism, and critical theory. The choice of a philosophical approach depends on the research questions, the study's aims, and the nature of the phenomenon being investigated. The selection of the appropriate philosophical approach is a critical decision that influences the entire research process, from data collection to analysis and interpretation.

The positivism/post-positivism paradigm, is characterised by its emphasis on empirical observation and testing, and it has been criticised for its limited applicability to social phenomena, where subjective interpretations and meanings play a significant role (Bryman, 2016). In contrast, the interpretivism constructivism paradigm places a greater emphasis on the role of interpretation, subjectivity, and context in shaping social phenomena and, as such, has gained prominence in qualitative research (Ryan, 2018). In the context of the present study, the interpretivism/constructivism paradigm aligns with the research objectives, which aim to explore the subjective experiences of school staff members, parents and male students on school-based PA. This paradigm recognises the complex and multifaceted nature of social phenomena, emphasising the importance of understanding participants' subjective experiences, meanings, and interpretations (Bryman, 2016). Furthermore, the interpretivism paradigm allows for the use of flexible and context-specific research methods, such as in-depth interviews and workshops, which are appropriate for exploring complex social phenomena (Ryan, 2018). Thus, this paradigm aligns with the research objectives and provides a suitable philosophical framework to guide this qualitative study.

This approach assumes that individuals have unique interpretations of their experiences, which are shaped by their social and cultural contexts (Creswell, 2014). Additionally, this

approach places great emphasis on understanding the unique interpretations and meanings that participants attach to their experiences, allowing for a rich and detailed exploration of the topic at hand.

5.6.1 The Rationale for Selecting an Interpretive Paradigm

The selection of an appropriate paradigm is crucial in guiding qualitative research, particularly in the exploration of social and health sciences. In this study, the researcher argues that the interpretive paradigm is the most suitable. This is because health and social sciences require different methods to understand knowledge compared to physical sciences as humans interpret their world and act based on their interpretation (Hammersley, 2012). Therefore, the interpretive paradigm adopts a relativist ontology, where a single phenomenon can have multiple interpretations rather than a single truth that can be determined through a process of measurement. This paradigm allows researchers to gain a deeper understanding of the phenomenon and its complexity in its unique context, rather than attempting to generalize the base of understanding for the entire population (Creswell, 2007). This is particularly relevant in this study, which seeks to explore the subjective experiences of school staff, parents, and male students towards PA in schools. The interpretive paradigm aligns with the study's aim to explore the perspectives of school staff members, parents, and male students, as it allows for an in-depth exploration of their experiences and perspectives regarding school-based PA. The interpretive paradigm allows one to appreciate the nuances of their experiences and the complex social, cultural, and institutional factors that may influence their perceptions, attitudes, and practices. Furthermore, it enables one to generate rich, detailed, and context-specific data that can illuminate the social and cultural meanings that school staff, parents and male students attach to PA.

This approach allows researchers to comprehend phenomena deeply in their socio-cultural contexts, considering shared belief systems within the society (Guba & Lincoln, 1994). Interactive interviews can provide valuable data on interviewees' thoughts, values, perceptions, perspectives, and emotions (Wellington & Szczerbinski, 2007). However, interpretive research is not without criticism. Scholars criticise the subjective notions of participants, and researchers may comprehend and analyse social reality with anticipatory prejudgment, leading to biased interpretations (Yanow, 2006). Additionally, interpretive studies may have small sample sizes, lack concrete speculation before conducting area work, and may have problems with generalizability and objectivity (Yanow, 2014). Despite these criticisms, interpretive research can provide valuable insights into complex phenomena within the context's complexity (Cohen et al., 2011; Blaikie, 2004), even though it may not address all research questions or anticipate future behaviours during data collection (Willis, 2013). Therefore, the interpretive paradigm remains a valuable approach for exploring the experiences of school staff, parents and male students on the barriers to and enablers of school-based PA among school male students, providing rich insights for future action.

5.6.2 Interpretive paradigm (four dimensions: Ontology, epistemology, methodology, and methods)

The interpretive paradigm is an appropriate approach to guide this study on exploring the school staff's, parents and male students' experiences on the barriers to and enablers of school-based PA among school male students. The paradigm comprises several components, including Ontology, Epistemology, Methodology, and Methods (Scotland, 2012). These elements are interconnected and provide a framework to guide the research process. Ontology deals with study of what constitutes reality (Hudson & Ozanne, 1988) and focuses on the phenomenon's existence. It seeks to determine the reality of a research question by pointing to existing knowledge. Epistemology, on the other hand, concerns how researchers gain knowledge about reality (Carson et al., 2001). It involves how researchers aim to

uncover knowledge and how they distinguish between right and wrong. Different paradigms hold different assumptions regarding ontology and epistemology, leading to different research approaches (Creswell, 2013). As an interpretive researcher, I align with a relativist ontology that perceives reality through intersubjectivity and considers meanings and understandings of social and experiential aspects in research (Saunders et al., 2012). I also hold a subjective epistemology that recognises the close link between research and research subjects, acknowledging that humans cannot be separated from their knowledge (Saunders et al., 2012). This approach allows for a deeper understanding of participants' experiences and the meanings they attach to their experiences. However, the interpretive approach has been criticized for its subjectivity and lack of generalizability (Guba & Lincoln, 1994). Nonetheless, interpretive researchers have developed rigorous research practices that address these concerns. By adopting these practices, interpretive research can provide valuable insights into social phenomena and contribute to the development of effective interventions aimed at improving PA (see Table 5.1 below).

Table 5.1: Interpretivism research philosophy (Source: Saunders et al., 2009).

Ontology, or the nature of reality and being	Epistemology is about what is considered acceptable knowledge	Axiology pertains to values in research	Typical methods
Ontology is intricate and shaped by social constructs, featuring diverse meanings, interpretations, and realities. It represents a dynamic flow of processes, experiences, and practices that are constantly changing. Understanding the socially constructed nature of ontology is critical to qualitative research as it acknowledges the complex interplay between individuals and their social context.	Simplistic theories prioritise narratives and perceptions, while a more nuanced understanding values diverse perspectives in generating new knowledge and emphasises the role of subjectivity.	It recognises the subjective nature of research and emphasises the importance of researcher reflexivity. By acknowledging the role of values, researcher can gain deeper insights into their own positionality and produce more nuanced research outcomes.	Typical qualitative research methods are inductive and involve small samples and in-depth investigations using qualitative analysis. A range of data can be used and interpreted, making the research adaptable to the research question.

5.7 Inductive approach

In qualitative research, the choice of research approach is critical to achieving the research objectives. An inductive approach is typically used in studies where the research question is exploratory, and the goal is to generate new knowledge or hypotheses. In this study, an inductive approach was deemed appropriate due to the lack of existing literature on the topic in KSA as discussed in Chapter Four. According to Denzin and Lincoln (2017), an inductive approach involves building abstractions, concepts, and theories from the data itself, thereby grounding the research in the participants' experiences and perspectives rather than being guided by pre-existing theoretical frameworks. This approach enables a more nuanced and contextualised understanding of the research topic, which is essential in exploratory studies.

Adopting an inductive approach aligns with interpretivism/constructivism principles, which emphasise the subjective nature of reality and the significance of individual perspectives (Creswell, 2014). This approach allows the researcher to capture the richness and diversity of participants' experiences by enabling themes and patterns to emerge from the data without being restricted by predetermined theoretical frameworks. Although the inductive approach may be perceived as less structured than other qualitative research methods, it still necessitates a rigorous and systematic approach to data collection and analysis, as emphasised by Charmaz (2014). The constant process of comparing, contrasting, and categorizing data involved in inductive analysis facilitates the identification of emerging patterns and themes. Overall, the use of an inductive approach in this study facilitated a thorough and nuanced exploration of school staff members, parents' and male students' experiences concerning opportunities and challenges of school-based PA. The study makes a distinct and valuable contribution to the literature on this topic by enabling themes and patterns to emerge from the data.

5.8 Research Design

Selecting an appropriate research design is a crucial aspect of conducting qualitative research, as it should align with the research objectives and aims. Therefore, this research employed a qualitative design, utilising semi-structured interviews with school staff members and parents, as well as workshops with male students. This approach enabled the collection of rich, detailed data regarding individuals' experiences, attitudes, and perceptions concerning PA (Creswell, 2013). The choice of a qualitative design was driven by the study's exploratory nature, aiming to uncover the complexities of PA engagement within diverse socio-economic contexts.

5.8.1 Justification for Choosing Semi-Structured Interviews with School Staff and Parents

To answer the research questions mentioned earlier in this chapter and for practical reasons, semi-structured interviews with school staff members and parents were chosen because they are considered a suitable method to assess people's perceptions, meanings, definitions, and constructions of situations (Bryman, 2012). The use of qualitative research interviews is a powerful technique for accessing information that cannot be obtained through other methods (Denscombe, 2017; Wellington & Szczerbinski, 2007). Semi-structured interviews provide a balance between flexibility and structure, allowing the interviewer to guide the conversation while also encouraging elaboration and two-way communication (Bryman, 2016; Creswell & Poth, 2017). Additionally, participants can provide rich insights into their needs and requirements in terms of designing and developing a PA intervention.

Furthermore, interviews with school staff and parents were chosen for many reasons. First, they allow school staff and parents to describe their experiences in terms of the opportunities and challenges of PA in their own words. Second, an interview gives the interviewee a chance to ask for clarification if they feel some questions are not understood; also, the

researcher can ask respondents to elaborate further on their responses. Third, participants can provide more information about how to design and develop an intervention and what are the facilitators and barriers to PA. Finally, the researcher can monitor participants' body language and facial expressions, as well as gauge their level of interest in the PA interview (Fontana & Frey, 2014).

However, there are some disadvantages to semi-structured interviews, as explained by Hersen & Gross (2006). The first is the time and travel costs involved, as the researcher travelled to KSA to conduct the face-to-face interviews. Nevertheless, the researcher prefers to do this to establish a personal and relaxed relationship with the school staff. The second disadvantage involves the difficulties in data analysis, thematic analysis, and identifying specific themes when the researcher does not maintain control over the content of the interviews. Therefore, it is important to ensure that most of the questions are answered and that the discussion remains under the control of the researcher. Gray (2021) supports the use of semi-structured interviews as an effective method for exploring the perspectives and opinions of participants.

5.8.2 Justification for Choosing Workshops with Male Students

Workshops with schoolchildren have emerged as a novel approach to data collection in qualitative research. Engaging with children in such workshops allows researchers to collect their thoughts, experiences, and perspectives on a specific topic or issue. The activities conducted in the workshop can vary from drawing and role-playing to group discussions, enabling researchers to gather rich qualitative data and gain valuable insights into the children's perspectives and experiences (Clark, 2011; Malinowski & Smith, 2014). However, ethical considerations are paramount when designing workshops with male students. Researchers must prioritise the protection of children's privacy and confidentiality, ensuring that their participation in the workshop is voluntary and informed (Alderson, 2012;

Clark, 2011). Therefore, the use of workshops with children can represent a valuable and ethical approach to data collection in qualitative research if these issues are considered and addressed. This method allows children to express their thoughts, feelings, and experiences in a manner that is meaningful to them. As noted by Wright and colleagues (2018), involving children in the research process can enhance understanding of their perspectives and help identify strategies to promote PA that are relevant and engaging to children.

The researcher chose this method to gather data from a range of male students to explore barriers and facilitators and to capture a complete picture of their needs, requirements, and acceptance of participation in PA. Furthermore, workshops with male students offer another effective way to gain in-depth views and knowledge, especially when the workshops include practical activities such as drawing, which serves as an alternative means of meaningful expression (Thomson, 2009). Also, male students provide the researcher with insights into their experiences, opinions, opportunities, and barriers regarding PA (Azzarito, 2016). Drawing techniques in workshops were considered a developmentally appropriate strategy to use with schoolchildren (Knowles et al., 2013). Moreover, this approach was used to increase the period of concentration and interest among male students in workshops and to encourage them to reflect on what PA might mean to them (Kennedy et al., 2001; Veale, 2005). However, it should be noted that running workshops with male students requires considerable preparation and skills. Kennedy et al. (2001) outlined some challenges that were considered in this regard, such as age differences, which should be minimised to a 1-2-year gap, since ability, comprehension levels, and sensitivities vary significantly at different ages. Alongside social status, culture, and personality are also significant aspects. For more details about challenges and how these were addressed, see section 5.10.8.

5.9 Recruitment Strategy, Sampling and Process

This section presents the recruitment strategy for schools and participants, explaining the sampling technique utilised in this research.

5.9.1 Recruitment of Schools

After obtaining ethical approval from the Ethics Committee at the School of Health and Related Research (ScHARR), University of Sheffield (see Appendix 5), and approval from the Saudi Ministry of Education (see Appendix 6), the researcher, with assistance from the Ministry, purposefully identified two contrasting schools for practical reasons. One public school is located in a deprived area, and one private school is situated in an affluent area. These schools were chosen based on specific characteristics, such as accessible space in school grounds and the availability of sports facilities. Purposive sampling was chosen to recruit schools and participants because this strategy is based on specific criteria specified by the aim and objectives of this research to determine the relevant participants and when, where to undertake interviews and workshops (Daymon & Holloway, 2010).

5.9.2 Recruiting School Staff

After obtaining permission from the Ministry of Education to conduct the research, meetings were held between the researcher and the principals of each school to seek their consent, to include their staff and male students in the research. At the initial meeting, the researcher discussed the purpose and significance of the study with the principals of the two selected schools. The aim was to outline all aspects related to the study and to gather their input on addressing potential challenges, such as the reluctance of some teachers to participate. Additionally, a formal pre-notification letter was designed and displayed on the noticeboards of each school to inform the staff about the project. The researcher then obtained approval to conduct an oral presentation for all staff members at each selected school, highlighting the importance of the study and aspects related to confidentiality and anonymity. Participant

information sheets and consent forms were provided to volunteers (see Appendix 7). Moreover, during the meetings, the dates and times for conducting interviews and the availability of participants were discussed.

To be eligible for inclusion in the interview, school staff members had to be employed within the selected schools and required to be Saudi nationals. This was to facilitate a deeper exploration and understanding of Saudi school teachers' beliefs, perceptions, and thoughts about the challenges and opportunities for PA among Saudi school children. Only male teachers were eligible to participate in the study, as per the assignment practices of male teachers to male schools by Saudi Arabian authorities.

5.9.3 Recruiting Male Students

After obtaining approval from the schools' principals to include their male students, the researcher attended normal classes with the assistance of teachers, explained the study's purpose to the students, and then distributed information sheets and consent forms (see Appendix 8). Male students were verbally invited to participate, and any student interested in participating in the workshops needed to sign the consent form. Furthermore, the schools were asked to send a consent form to the students' parents for signature before including their children in the workshops (with 20% oversampling to account for the possibility of some students wanting to participate but their parents refusing).

To be eligible for inclusion in the workshops, male students had to be enrolled in the selected schools, aged between 13 and 15 years and provided informed consent from both themselves and their parents.

5.9.4 Recruiting Parents

During the initial meeting with the schools' principals, the researcher expressed his interest in recruiting fathers, emphasising that their perspectives are valuable for exploring opportunities and challenges related to PA in schools. The decision to focus solely on fathers was influenced by cultural norms in KSA, which make it challenging to recruit mothers for such research activities.

One principal suggested leveraging the next scheduled communication meeting between the school and parents as an opportunity to meet fathers and invite them to participate in the study. The researcher attended this meeting, engaged with many fathers, highlighted the importance of the study, and discussed aspects related to confidentiality and anonymity. Information sheets and consent forms were distributed (see Appendix 7).

5.9.5 Sampling Strategy

Ensuring an accurate representation of a population in a sample is a challenging task (Gray, 2014). The approach was to select a sample reflecting the population's essential attributes, including the variety of school staff members at the intermediate schools. The sample's composition was also influenced by the willingness of individuals to participate in the research. To identify school staff, male students, and parents who could provide the most valuable insights for answering the research questions, the researcher employed purposive sampling methods (Etikan, 2016). A purposive sample is intentionally selected to meet the research goals, meaning it targets individuals with specific characteristics or knowledge (Wellington, 2015).

The specific characteristics required to meet the purposive sampling strategy included having a direct role or significant involvement in the educational processes at intermediate schools. For school staff, this included teachers, administrators, and support staff with at least two years of experience. To ensure a range of perspectives, the researcher selected staff

from different subjects, including both PA and other subjects. For students, it was important that they were currently enrolled in the intermediate schools and aged 13 to 15 years. The researcher recruited from classes where he confirmed that all students were within this age range to avoid the need for exclusion. For parents, any parent of children aged 13 to 15 years who was willing to participate was included in the study.

Creswell (2013) and Bryman (2012) declare that in the field of health research, qualitative interviews should be conducted until they reach data saturation. Therefore, the researcher conducted interviews until no more themes could be derived. Qualitatively, this indicated that efforts have been made to conduct rigorous research. According to Morgan et al. (2002), the first five or six interviews provide novel data and concepts.

5.9.6 Piloting the Semi-Structured Interviews and Workshops Topic Guides

The researcher developed the topic guides for the interviews and workshops, but they had not been previously validated. Consequently, all interview and workshop questions were translated into Arabic and piloted using two teachers and four male students from the selected schools. Gibson (2007) suggests that piloting is very helpful to minimise the collection of unnecessary data and prevent the accumulation of excessive amounts of data. This pilot study was conducted for several reasons: to assess the reliability and validity of the questions, to determine whether the questions and aims were appropriate and clear for the target population, to estimate the time required to respond to the questions, and to evaluate if some questions needed to be revised to align with the study's aims and objectives.

During the pilot, the researcher anticipated discrepancies between his expectations and the practical experience. Upon reviewing the interview recordings, the researcher observed that some questions have been asked multiple times, albeit phrased differently. Additionally, the researcher noted instances where he interrupted the interviewee to explore an intriguing point further, which led to leaving the initial question partially unanswered. The complexity

of some questions posed challenges for the participants. In response, the researcher revised the questions to simplify and focus them, including narrowing down one particularly broad question that had confused the participants. These adjustments aimed to eliminate identified errors in subsequent interviews. Moreover, this stage helped the researcher identify the time required to respond to questions, which was found to be 35 to 45 minutes and led to some questions being amended to be more suitable for male students.

The data collected during the pilot study was not included in the final dataset. This decision ensured that the final dataset only comprised data gathered using the refined and validated interview and workshop questions.

5.9.7 Semi-structured Interviews with School Staff

Interviews with school staff were conducted in quiet rooms within the schools at mutually agreed times, ensuring privacy for all participants. The data collection period was from April to July 2022. At the beginning of each interview, the researcher welcomed the participant and provided a brief overview of the study, recapping key information from the information sheet. This included details about the study's purpose, the interview process, participants' rights to withdraw, and other relevant aspects. Following this introduction, informed consent was obtained, emphasising the study's voluntary nature. This introduction aimed to create a non-threatening environment, encouraging staff to share their experiences openly. All interviews were conducted in Arabic to facilitate clear communication.

Additionally, the interviews were recorded with a digital recorder, and notes were taken to ensure accuracy in data collection. The semi-structured interview topic guide was developed by the researcher and informed by the study's objectives and insights from the systematic review discussed in the previous chapter and was also adjusted in line with the pilot interviews. The researcher also shared initiatives implemented in Arabic countries and elsewhere, engaging with the school staff to explore what they believed could be applicable

in their context. This dialogue also sought to gather their perspectives on the advantages and disadvantages of various approaches.

As detailed in Table 5.2 below, the questions were carefully selected and posed during the interview to guide the conversation effectively.

Table 5.2: Semi-Structured Interview Topic Guide for School Staff

1.	What is your view of PA in daily life? Is it something that's important to you?
2.	What types of physical activities are presently conducted in this school? Please tell me about it, and how long does it last?
3.	Does the current PA in your school educate, or is it sufficient to increase student's PA levels?
4	In your school, do you have any type of event that encourages students to be more physically active? If yes, can you tell me more about it?
5.	What do you think are the advantages and disadvantages of the different approaches that have been implemented in Arabic countries and globally, as we have discussed? Do you think some of them would be applicable in your school? Which one? Why do you think that?
6.	How can we help students to be more active and motivated to participate in PA in your school? Please expand on your answer.
7	If you were offered to have a PA program in your school, how would you go about it? Is there a school policy for PA?
8	What do you think would be the best time to implement a PA programme? inside a school or after school? Where? How often? By whom, school staff or people from outside? Why do you think that?
9	What are the barriers to implementing a PA programme in your school? How would you overcome these barriers?
10	Are there any other points you would like to discuss in this regard?

5.9.8 Workshops Process

This study included two series of workshops with each school's male students aimed at exploring their perspectives on PA in their daily lives and developing strategies to increase PA levels. The first workshop focused primarily on discussions around PA, where students were prompted to express their perspectives and encounters with PA within and outside their schools. This session took place in a room prepared by the school specifically for this purpose, supported by a teacher. The researcher began the session by reading aloud a standard statement outlining the study's objectives and the ground rules for the discussion. To ensure support and facilitate communication, a research assistant who was also a schoolteacher was present.

The second workshop, held in the same room the following day, was designed to foster creativity and engagement through a drawing exercise. Prior to starting the drawing activity, male students were asked to form groups according to their preferences, creating a collaborative and comfortable environment. They were then given the following instructions: "Draw a picture that represents what you want to do as PA. Include any barriers or facilitators you experience in being active." This directive aimed to prompt male students to reflect on their personal experiences with PA and visually express their thoughts and feelings about it.

Male students were given 30 minutes to complete their drawings, during which they were allowed to talk and discuss their ideas with peers, making the activity both interactive and reflective. This approach, consistent with findings from Knowles et al. (2013), was chosen to ensure participation and to make the workshop more appealing, stimulating creativity and enhancing concentration among the students. After the drawings were completed, a group discussion was facilitated where male students shared their drawings with the group and

explained the ideas depicted, fostering a deeper discussion on the significance of PA in their lives.

Both workshops were conducted in Arabic to ensure clear communication and were recorded with verbal permission from the male students to foster an open and non-threatening environment conducive to sharing experiences. The use of drawing was highlighted as an effective method to encourage participation and facilitate discussion about PA. Furthermore, such approaches have been shown to enhance concentration and interest levels among children in workshops, encouraging them to ponder the significance of PA in their lives (Kennedy et al., 2001; Veale, 2005).

All discussions were recorded, and written notes were taken. Specific questions listed in Table 5.3 guided the discourse according to the predetermined objectives of the workshop.

Table 5.3: Workshop Discussion Topic Guide

1.	What is your view of PA in daily life? Is it something that's important to you?
2.	In your view, what are the benefits of participating in regular physical activities?
3.	What types of PA do you have in this school?
4.	What are the barriers to participating in PA?
5.	What do you think are the advantages and disadvantages of the different approaches that have been implemented in Arabic countries and globally, as we have discussed? Do you think some of them would be applicable in your school? Which one? Why do you think that?
6.	What do you think would help you and make you motivated to participate in PA?
7.	If we were to offer you an opportunity to choose whatever you like to do as PA, what would you suggest doing? Within the school or after school time? When? How often? For how long? Why do you think that?
8.	How would you like to do PA? By whom, school staff or people from outside the school? Why do you think that?
9.	Are there any other points you would like to discuss in this regard?

5.9.9 Semi-structured Interviews with Parents

The researcher, with the support of the school principal, extended invitations to parents for participation in the study, offering them the option to meet either in person at the school, over the phone, or online. Seven fathers expressed their willingness to participate and preferred to meet in person at the school. The interviews were scheduled at times that were mutually convenient for the schools, the parents and the researcher.

Upon arrival at the schools for the interviews, the researcher personally welcomed each father. An information sheet was then provided to each interviewee, detailing everything related to the study. This included its purpose, the progression of the interview, and how participants could withdraw from the study, among other aspects. Following this briefing, consent forms were collected, and permission was obtained for recording the interviews.

As detailed in Table 5.4 below, a range of questions was posed during the interviews to guide the discussion in alignment with the study's objectives.

Table 5.4: Semi-Structured Interview Topic Guide for Parents

1.	What is your view of PA in daily life? Is it something that's important to you?
2.	In your view, what are the benefits of participating in regular physical activities for children?
3.	During your childhood in school, how physically active were you? When you were at school, do you think you had more, or fewer opportunities compared to what your son has nowadays either in school time or in your neighborhoods?
4.	What do you think are the barriers to participating in PA for school children in school time?
5.	In your view, do you think PA is very important as other academic subjects in school for students or not? Why do you think that?
6.	Can you identify the best way to inform or advise schoolchildren about the importance of PA?
7.	Do you have any ideas on ways to improve or encourage schoolchildren to promote PA in schools?

8.	If you had the opportunity to choose a PA programme for school children, what would you choose for them? When? In school time or after school? By whom? School teachers or professionals from outside? How many times? Why do you think that?
9.	In your opinion, what are the obstacles that limit the practice of PA in schools? Why do you think that?
10.	What do you think would help and make students motivated to participate in PA?
11.	Are there any other points you would like to discuss in this regard?

5.10 Ethical Considerations

While social science research generally poses less risk of harm to participants than medical research, it still involves human subjects who might be affected by the research outcomes (Gray, 2014). Consequently, establishing protective guidelines for participants is crucial. In this research, ethical approval for this study was obtained from the University of Sheffield in April 2022 (see Appendix 6), and from The Ministry of Education in KSA (see Appendix 7).

Gray (2014) organizes the principles of research ethics into four key categories, offering a comprehensive insight into the various facets of ethical considerations. These include safeguarding participant privacy, guaranteeing informed consent, minimising risks, and preventing deception. The detailed discussions of these topics are elaborated upon in subsequent sections below.

5.10.1 The Participant's Privacy

Before commencing the interviews and workshops, the researcher obtained informed consent from all participants. Specifically, for the workshops, consent was acquired both directly from the male students and from their parents. Throughout the study, the researcher consistently reminded participants of their right to abstain from answering any question and to withdraw from the study at any point. It was emphasised that the use of real names was

not required, with two teachers instead choosing pseudonyms for themselves to be used in the research. Additionally, the researcher obtained consent for the potential publication of research chapters in peer-reviewed journals or their presentation at conferences (detailed consent procedures are available in Appendix 8 and 9). To further protect privacy, the researcher referred to participant quotes by the school type and an assigned number.

5.10.2 Informed Consent

Providing participants with comprehensive information about the research is essential. This information should cover the research objectives, the expected time commitment from the participants, the voluntary nature of their participation, and assurances of their anonymity (Gray, 2014).

In this research, each participant was required to sign an informed consent form before participating in the interview. During the consent process, participants were given an information sheet that detailed the research title, what was expected of them, the purpose of the study, and their right to withdraw at any time without needing to provide a reason (Informed consent and information sheet are included in Appendix 8 and 9).

Before the workshops began, male students' participants were also required to sign a consent form. Additionally, consent was obtained from their schools and their parents to include them in the study (Informed consent and information sheets for students are found in Appendix 9 and for their parents in Appendix 10).

5.10.3 Minimising Risks

This research posed minimal risk to either the researcher or the participants, as it was conducted in schools. Saudi schools are equipped with security and safety measures that ensure the safety of individuals. All interviews with school staff and parents were conducted within the school premises and during school hours. Additionally, the workshops with male

students took place during normal lesson times and within school hours. Furthermore, a research assistant, who was also a male schoolteacher, was present at both workshops to address any issues such as late arrivals or students needing to visit the bathroom. This assistant was also available to provide reassurance to anyone who might appear upset or wish to leave the discussion. All these procedures were designed to create a non-threatening environment that encourages students to share their experiences and feel at ease (Gibson, 2007).

5.11 What the Researcher Did with Raw Data Before Analysis

Upon beginning transcription, the researcher ensured that all personally identifiable information provided by participants was either removed or altered to maintain confidentiality. Interviews and workshops were recorded using an encrypted digital recorder, and field notes were taken. The researcher transcribed all interviews and workshop discussions in Arabic, anonymising the transcripts and removing any potential identifiers before they were handed over to a professional translator. Consent forms were scanned and immediately uploaded to a secure University drive (X: Drive), along with transcripts. To facilitate organisation, separate files were maintained for each type of data. The researcher promptly destroyed the paper copies. Furthermore, audio data was uploaded to secure storage as soon as feasible, and recordings were deleted from the device once they had been transcribed, verified, and successfully uploaded to the University's file storage system. Participants were assigned a unique code number, which was used when referencing their responses directly. All such data is securely stored on the university's X: Drive, accessible only to the researcher and supervision team.

5.12 The Process of Translation

All materials for the interviews and workshops were initially translated from English into Arabic by the researcher, as they were conducted in Arabic. Subsequently, a back-translation

process was employed to verify the accuracy of the translation. This process involved re-translating the Arabic materials back into English and then comparing this back-translation with the original English versions. The objective was to ensure no discrepancies existed between the two versions.

The initial translation from English to Arabic was undertaken by the researcher, followed by a reverse translation from Arabic back to English by official translators. All interviews, originally conducted in Arabic, were translated into English by an official translator and subsequently reviewed by the researcher. This step included re-translating the English materials back into Arabic and comparing them to the original Arabic versions to ensure that the translations were accurate and that the meanings had not been altered. Only anonymised transcripts were used for translation, conducted by a professional translation service in KSA. This service adheres to confidentiality agreements, ensuring the secure transfer of transcripts via a protected connection to safeguard the data.

It is important to note that the interviews and workshops were conducted in Arabic, the native language of both the participants and the researcher, to maintain the integrity of the responses. The researcher transcribed and analysed the data in Arabic to preserve the original meaning. Subsequently, all transcripts were translated into English for two main reasons: to facilitate sharing with the supervisory team and to extract quotations for inclusion in the thesis.

5.13 Reliability and Validity of the Qualitative Study (Trustworthiness)

The trustworthiness of data in qualitative research involves addressing reliability and validity issues (Pitney & Parker, 2009). Qualitative research presents challenges such as potential bias and limitations on generalisability. However, when conducted rigorously, it can yield valid, reliable, credible, unbiased, and meaningful data (Anderson, 2010).

In this study, the researcher adopted several strategies to validate and enhance the trustworthiness of the findings, focusing on dependability, credibility, transferability, and confirmability as the four main components.

To enhance the dependability of this research, the researcher implemented member-checking and triangulation techniques (Motulsky, 2021). Member checking was conducted by sharing preliminary findings with participants for feedback and corrections. Triangulation was achieved by using multiple data sources and methods to corroborate findings and minimise bias, incorporating perspectives from three types of participants: students, school staff, and parents (Yin, 2013; Santiago et al., 2016). This approach allowed to compare and cross-validate the data from these different groups, ensuring that the findings were reliable.

Specifically, the researcher analysed the themes that emerged within each group and then compared them across the groups to identify patterns and discrepancies. For example, the researcher examined whether the perceptions of school-based PA interventions among students aligned with the views of school staff and parents. The researcher also looked for consistencies or divergences in the challenges and facilitators reported by each group.

Through this process, the researcher was able to identify common themes that were shared across all groups, such as the importance of culturally appropriate activities and the need for greater parental involvement. At the same time, the researcher noted areas where the perspectives diverged, such as differences in how students and parents perceived the role of school staff in promoting PA. By systematically comparing these themes, the researcher ensured that the conclusions were well-supported by data from multiple sources, thereby strengthening the validity of the findings.

To enhance credibility, techniques such as prolonged engagement and reflexivity were employed. Prolonged engagement involved investing substantial time to build trust and

rapport with participants. Reflexivity entailed continuous reflection on the biases and assumptions and their potential impact on data interpretation (Darawsheh, 2014).

For transferability, the researcher provided detailed descriptions of the research context, participants, and the data collection and analysis procedures (Shenton, 2004). Additionally, the researcher used thick descriptions to allow readers to understand the context and experiences of the participants fully.

To ensure confirmability, techniques like maintaining an audit trail and conducting peer debriefings were used. The audit trail consisted of keeping comprehensive records of all research activities. Peer debriefing involves discussing findings and interpretations with the supervisory team to gain their feedback and insights (Shenton, 2004).

By applying these various strategies, the researcher was able to strengthen the trustworthiness and validity of the qualitative findings, offering a comprehensive and nuanced understanding of the experiences of school staff, parents, and students regarding the opportunities and challenges of school-based PA among school children.

5.14 Qualitative Data Analysis Procedures

This section explains how the researcher analysed the qualitative data collected via semi-structured interviews and workshops. The analysis was conducted through several phases, each of which is explained below:

5.14.1 Phase One: Preparation for Analysis

In preparation for analysis, the researcher read widely in the literature for studies that utilize qualitative research methods, referencing works such as Saldaña (2016), Gray (2014), Braun & Clarke (2006, 2012), and Wellington (2015), in addition to peer-reviewed articles, theses, and dissertations. Interviews and workshops were transcribed verbatim in Arabic either on the same day or shortly thereafter, with careful attention to participant privacy by omitting

any identifiable information. Following transcription, the accuracy of the transcripts was verified against the audio recordings, correcting any discrepancies found. This verification process involved multiple listening to the recordings of each participant and a thorough review of each transcript, aiming to identify patterns by revisiting them several times.

5.14.2 Phase Two: Software Selection and Theoretical Framework

Prior to software selection, the researcher systematically organised the data into distinct folders: interviews with school staff from a private school, interviews with staff at a public school, interviews with parents, and two separate folders for workshops conducted at both schools. Following this, all these folders were imported into MAXQDA-Vision 22, which was chosen for the analysis of the qualitative data. MAXQDA-Vision 22 was deemed particularly useful for its capabilities in organising, managing, and storing qualitative data (Rädiker & Kuckartz, 2019). Its selection was further justified by its support for Arabic and enhanced data organisation features.

The SEM was utilised to analyse the data by examining multiple levels of influence on behaviour. The SEM framework helps in understanding how individual, interpersonal, organizational, community and policy factors interact to impact PA levels among schoolboys' children (see Figure 2.1. in Chapter Two explaining the levels of the SEM).

The application of the SEM involved a multi-step process to analyse the qualitative data effectively. Initially, the qualitative data were categorised according to the five levels of the SEM, allowing for the identification of factors influencing PA at each level. This categorisation facilitated the TA, wherein themes were derived from the data within each SEM level to understand the specific influences and interactions affecting PA. Furthermore, an analysis was conducted to explore how factors at different levels of the SEM interact to influence PA behaviours, providing a comprehensive understanding of the multi-faceted determinants of PA among schoolboys.

5.14.3 Phase Three: Choosing the Suitable Method for Analysis

In any qualitative research design, it is critical to select an appropriate data analysis technique that aligns with the research aim and objectives. A variety of qualitative data analysis techniques are available, including thematic analysis (TA), qualitative content analysis, narrative analysis, discourse analysis, grounded theory (GT), and interpretive phenomenological analysis (IPA) (Braun & Clarke, 2021; Creswell, 2013; Nowell et al., 2017). Among these, the researcher selected TA for this study after carefully considering and evaluating various techniques.

All data collected through the interviews and workshops were analysed using a TA approach, which identifies different themes and patterns from a set of texts (Braun & Clarke, 2006). TA involves counting phrases and texts, as well as identifying implicit and explicit ideas within a dataset. This process includes examining keywords and how they relate to each other within the data (Braun & Clarke, 2006). TA was chosen for this study because it offers flexibility, allowing the researcher to define themes in various ways. The following approaches were used for data analysis:

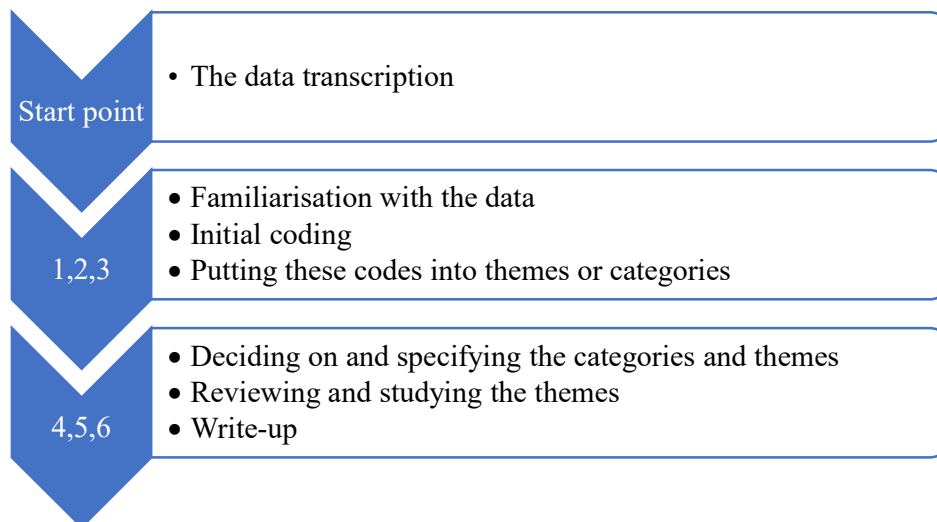


Figure 5.3: Approaches were used for data analysis adapted from (Braun & Clarke, 2006)

To develop familiarity with the data, the researcher read the transcripts multiple times before employing the thematic analysis framework (Braun & Clarke, 2021). The initial codes were generated by analysing the first interview transcript by hand.

Then all interview and workshop transcripts were imported to MAXQDA software recommended by Rädiker & Kuckartz (2019) to enable the researcher to organise the data. The codes were then grouped into comprehensive categories, and themes and subthemes were assigned. The researcher reviewed the themes to guarantee their distinctiveness and non-overlapping nature. The themes were continuously refined by discussing them with the supervision team.

To ensure accuracy, the themes were scrutinised in the context of the entire data set. Quotes were provided, annotated by teacher number and school type. All data collected from these interviews and workshops were analysed thematically, following the approach for the data analysis explained by Braun and Clarke (2006). Notably, the researcher transcribed and analysed in Arabic to preserve the core meaning and then translated all transcripts into English for two reasons: to share these transcripts with the supervisor team and to extract quotes for the thesis. Additionally, during the analysis, the researcher critically reflected on his reflexivity notes to identify how his personal biases could have influenced the results. This critical reflection served to enhance the study's validity and reliability by preventing personal biases from influencing the findings. Finally, the male focus of this study was considered throughout the analysis, with attention given to how gender influences the identified themes.

5.15 Researcher Positionality and Reflexivity

In qualitative research, the researcher's positionality plays a significant role in shaping the research process and outcomes. Positionality refers to the recognition of the researcher's background, experiences, and perspectives, and how these may influence the research

(Bourke, 2014). This section reflects on the researcher's positionality within the context of this study and how it may have influenced data collection and analysis.

5.15.1 Personal Background and Perspective

As the primary researcher, I am a male Saudi national with a background in PE and health sciences. My professional experience in the education sector and my personal commitment to promoting PA informed my interest in this research topic. Being a native Arabic speaker and familiar with the cultural context of the KSA, I had an inherent understanding of the societal norms, values, and practices that influence PA among adolescent boys in Jeddah.

5.15.2 Influence on Data Collection

My position as a Saudi male likely facilitated access to the schools and participants, particularly in a cultural context where gender norms can influence interactions. My background in PE may have helped in establishing rapport with school staff, parents, and students, as they might perceive me as knowledgeable and passionate about the subject matter. However, this familiarity and shared background also posed the risk of bias. For instance, participants might have tailored their responses to align with what they perceived to be my expectations or viewpoints, especially given my role as an advocate for PA.

To mitigate these potential biases, I adopted several strategies:

- Ensuring that the information sheets and consent forms emphasised the voluntary nature of participation and the confidentiality of their responses.
- Encouraging participants to speak freely and honestly by creating a non-judgmental and supportive interview environment.
- Employing a research assistant during workshops to facilitate discussions and observe interactions, thus providing an additional layer of objectivity.

5.15.3 Influence on Data Analysis

During the data analysis phase, my background and perspectives could have influenced the interpretation of the data. My professional experience might have led me to prioritise certain themes or overlook others that did not align with my preconceptions about PA in schools. To address this, I engaged in reflexivity throughout the analysis process as explained earlier in section 5.14.

Finally, by acknowledging my positionality and implementing these reflexive practices, I aimed to enhance the credibility and trustworthiness of the research findings. Recognising and reflecting on the influence of my background allowed me to remain conscious of potential biases and strive for a more balanced and comprehensive understanding of the barriers and enablers of PA among school-aged children in Jeddah, KSA.

5.16 Public Involvement

Nowadays, public involvement in research is widely recognised as a means of ensuring that research relevant to the feasibility and appropriateness of research activities as well as relevance are all potentially enhanced (Gamble et al., 2015). In this research and during the development of the proposal for this qualitative study, public involvement was conducted, three members of the public interested in this research area were identified through advertisements on social media. One of them was a principal, another a PE teacher and the last one was a male student of relevant age in a Saudi school.

Meeting times were decided by the volunteers according to their availability. The purpose of this public involvement was to explore the following:

- To check the proposal for the research – is it viable and important?
- To get suggestions to change or highlight any relevant issue in the research proposal.
- To advise on the appropriateness of the methods selected to carry out this research.

The meeting with the principal was conducted on Saturday 25th September 2021 at 3 pm and ran for 55 minutes. The second meeting with the PE teacher was conducted on the same day at 5 pm and ran for one hour, and the third meeting with the student was conducted on Monday 27th September 2021 at 6 pm and ran for 48 minutes. All meetings were organised through video calls since the researcher resides in the UK. Furthermore, it was not possible to record any of the meetings, as no consent in this regard was obtained, but notes were taken by the researcher to make sure no important information was missed. All volunteers were male, and they were in intermediate schools in KSA.

The researcher explained the research proposal in the Arabic language, as well as the aim, objectives and methods that would be used, to gain feedback and suggestions. The feedback received had a substantial impact on the research design:

- Scope of Participant Inclusion: Initially, the study was focused on science teachers. However, based on the suggestion from the PE teacher, the scope was broadened to include teachers from other disciplines, recognising that their perspectives are equally vital to the school's acceptance.
- Volunteers were interested in this research, since the idea has not been implemented in their schools and they felt that it was very significant and should be implemented. (The meeting results provided support for the importance of conducting the research, this evidence is informed by relevant public views, not just academics).
- The interviews should be offered to a wider cohort than science teachers because the views of other teachers are also important to school acceptance. (This point changed in the proposal after this public involvement).
- They advised that when the results of this study are known, they would be happy to work collaboratively and carry on their contribution to the research.

At the end of each meeting, the researcher thanked the volunteers for their kind cooperation with a promise to share the results of the study with them, in order to seek their further advice.

5.17 Conclusion

This chapter has established a methodological approach specifically tailored to explore the challenges and opportunities of PA among male school students in Jeddah, KSA. The chosen qualitative design and methods—comprising semi-structured interviews and workshops—were selected to deeply understand the nuanced perspectives of participants, which are critical to addressing the central research questions. The recruitment, sampling, and ethical frameworks were designed to ensure a comprehensive and respectful engagement with the community, reinforcing the study's integrity and alignment with the philosophical paradigms that guide this research. Importantly, the inclusion of public involvement prior to the main study highlights our commitment to a participatory research approach. These methodological decisions are pivotal in laying a credible foundation for exploring how socio-cultural factors influence PA, setting the stage for impactful insights and potential interventions in Jeddah schools, KSA.

Chapter Six: Exploring PA Promotion in the School Setting: Results

6.1 Introduction

The previous chapter discussed the research strategy, including the philosophical paradigm underpinning this research, the sampling technique, data collection methods, data analysis procedures, and ethical considerations. This chapter presents the qualitative findings obtained through two data-gathering methods employed in this study: semi-structured interviews with school staff members and parents, as well as workshops conducted with male students. The findings are presented in a two-fold manner. First, descriptive data are presented to clearly understand the participants involved. Subsequently, the results from the semi-structured interviews and workshops are presented as themes and sub-themes. These are organised based on the SEM which served as a fundamental framework for analysis.

6.2 Characteristics of the Schools and Participants

This research was conducted in two contrasting schools and covers two different geographical locations in Jeddah city in the KSA, namely a private school located in an affluent area and a public school located in a deprived area. Sixteen school staff members from the two schools were interviewed, with nine belonging to the private school and seven from the public school. Participants' ages at both schools ranged from 32 to 48 years, with an average teaching experience of 15 years, varying from five to 24 years. All interviewees were Saudi nationals and taught various subjects, including two PE teachers.

Initially, eleven members from the private school and nine from the public school expressed interest in participating in the interviews. However, two teachers from the private school later declined to participate because they thought the researcher was an investigator from the Ministry of Education. In the public school, one teacher declined participation seeing no

benefit from it, and another did not attend the scheduled interview. The interviews varied from 31 to 48 minutes, demonstrating the thoroughness of the discussions.

Thirty-seven male students aged 13 to 15 from both schools also contributed to the data collection process by attending two workshops each. The private school provided 19 students, whilst the public school supplied 18 for these workshops. Initially, 28 students from the private school and 24 from the public school expressed their interest in participating in the workshops. Later, only 19 students from the private school and 18 from the public school met the criteria stated above. Nine students did not bring consent from their parents for unknown reasons, and six students from the public school were also unable to participate due to the same issue.

Initially, nine fathers contacted the researcher and expressed their interest in participating. During these phone calls, the dates, times, and locations for conducting interviews were discussed. Ultimately, seven fathers attended the interviews, while two were absent at the scheduled interview times. Details about the interview process are further discussed in section 5.10.9. The interviews with the parents lasted between 26 and 46 minutes.

Finally, this research achieved interviews with 16 school staff members, 9 members belonging to the private school, and 7 members belonging to the public school. Thirty-seven male students aged 13 to 15 from both schools also contributed to the data collection process by attending two workshops each. The private school provided 19 students, whilst the public school supplied 18 for these workshops. Seven fathers also contributed. Detailed information about the distribution of participants in each school can be found in Table 6-1 below:

Table 6- 1 Characteristics of the Schools and Participants

Type of school	Private school	Public school
Location	In an affluent area	In a deprived area
Number of school staff members	Seven teachers One principal One administrator Total (nine)	Five teachers One principal One coordinator Total (seven)
Number of male students	Six students (13 years) Seven students (14 years) Six students (15 years) Total (nineteen)	Five students (13 years) Six students (14 years) Seven students (15 years) Total (eighteen)
Number of fathers	Five	Two

6.3 Themes and Sub-themes

This qualitative study involved conducting interviews with school staff and parents as well as workshops with male students. By utilising the SEM, five main themes and 14 sub-themes were identified (see Table 6-2). These were then organised into five themes corresponding to different SEM levels: two themes were associated with the intrapersonal level, one with the interpersonal level, one with the organisational level, and finally, one theme was related to the environmental level (see Figure 6-1).

The first theme, ‘Motivating Factors (at the intrapersonal SEM level)’, explores the internal factors influencing engagement in PA and the restrictions to male students’ PA. Within this theme, three sub-themes emerged. The sub-theme ‘Enjoyment and Competition’ focuses on the role of intrinsic motivation derived from the pleasure of PA and the competitive nature it instills. ‘The Benefits of PA’ discusses individuals’ subjective evaluation of the advantages

of regular PA (psychological, sociological, and health-related). Lastly, 'Behavioural and Psychological Factors Influencing PA Attitude' investigates the personal beliefs, self-efficacy, and past experiences shaping individuals' attitudes towards PA.

The second theme, 'Time Limitations, sits within this level, comprising two sub-themes that act as barriers to PA. 'Curriculum Overload' explores the challenges posed by a full academic curriculum that leaves limited time for PA. 'Competing Uses of Time' examines individuals' difficulties in effectively managing their time to incorporate PA into their daily routines. Moving to the interpersonal level, the third theme, 'Social Support,' looks at the role of support received from various sources in facilitating PA. This theme contains three sub-themes: 'Parent Support' examines the influence of parents in encouraging and facilitating PA participation. 'Peer Support' explores the role of peer support and social networks in promoting PA engagement. 'Teacher Support' focuses on the significance of teachers' guidance and encouragement in fostering PA among students.

At the organisational level, the fourth theme, 'Aspects of School Environment', focuses on the organisational factors influencing PA participation and consists of three sub-themes: 'Subject Content and Regulations' examines how the content and regulations surrounding PE classes can either facilitate or hinder PA engagement. 'School PE Class' explores the influence of a school's PE curriculum and facilities on male students' access to PA. 'Inequality in Access to Facilities' addresses the disparities in accessing PA facilities among different male schools.

Finally, at the community level, the fifth theme, 'Potential Approaches to Enhance PA', presents three sub-themes highlighting potential interventions to promote PA at the community level. The sub-theme 'The Role of Cross-Cultural Adaptation' focuses on participants' views on specific programmes, their appropriateness for Saudi schools, and the reasons behind these perspectives. 'The Role of Local Educational Authorities' emphasises

the importance of local educational authorities in implementing policies and programmes encouraging PA. ‘The Role of Local Proposals’ suggests programmes recommended by male students, their parents, and school staff to provide more opportunities for students to engage in PA.

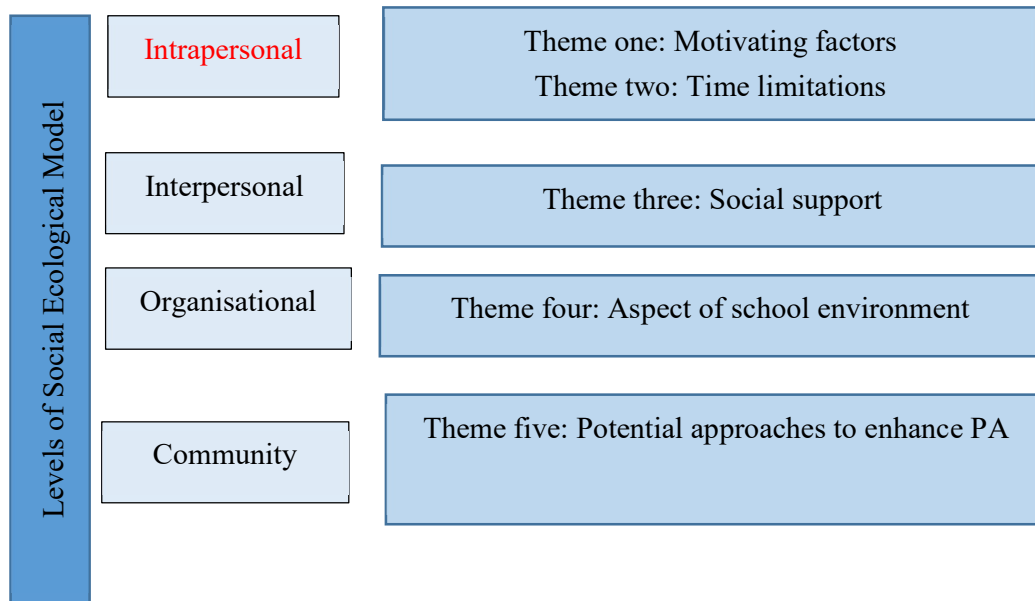


Figure 6-1 A thematic map showing the organisation of themes relating to different levels of the SEM.

Table 6.2: Themes and Sub-themes

#	Themes	Sub-themes	Elements	
1	Motivating factors <i>(Intrapersonal level)</i>	Enjoyment and competition	The desire to do PA. Faith motivation Self-motivation Fun as motivator Break the daily routine Team plays The competition Choice and autonomy	
		The benefits of PA	Academic benefits	Increase concentration. Improve understanding. Improve academic achievements
			Psychological benefits	Reduces stress Improves mood Helps reduce depression
			Health benefits	Maintaining physical fitness Strengthening muscles Burning fat, losing weight and preventing obesity Stimulating the happiness hormone Improving the circulatory system Improving self-image
			Mental benefits	Developing mental abilities
		Behavioural and psychological factors influencing PA attitude	Lack of skills, lack of interest, excess weight, bullying peer Preferring electronic games Laziness, fear of injury and peer imitation	

#	Themes	Sub-themes	Elements
2	Time limitations <i>(Intrapersonal level)</i>	Curriculum overload	Study pressure Homework Exams
		Competing uses of time	Playing electronic games Watching TV Lack of scheduled time for PA Spending time with peers
3	Social Support <i>(Interpersonal level)</i>	Parental support	Promoting their children to be active Encouragement Rewards for exercise Parental modelling
		Peer support	Company Encouragement
		Teacher support	Involve the PE teacher Verbal encouragement

#	Themes	Sub-themes	Elements
4	Aspect of School Environment <i>(Organisational level)</i>	Subject content and regulations	Allocate one PA session a week. Follow Ministry instructions. The significant number of students in class School policy (students' safety and protection)
		School PE class	Limited PA opportunities Lack of facilities (funds, equipment, spaces) Lack of access to the playground Some difficulties, such as high temperature (weather), lack of safety and the impact of COVID-19 on PA Shortage of qualified PA teachers
		Inequality in accessing facilities	Availability and accessibility Diversity in activities
5	Potential Approaches to Enhance PA <i>(Community level)</i>	Role of Cross-Cultural Adaptation	What did they think about these specific programmes? Will they be adopted in Saudi schools, or not? Why?
		Local proposals suggested	Different activities three times a week Walking programme Football three times a week Jogging programme Weightlifting programme Educational programme Step-counting programme Evening programme (open day)
		The Role of Local Educational Authorities	Enacts new policies to reframe PA programmes in schools.

6.4 Theme One: Motivating Factors

This theme focuses on the internal factors influencing PA engagement and restrictions on male students' PA. Within this theme, three sub-themes were identified. The first was enjoyment and competition. Participants expressed that the enjoyment gained from participating in PA positively impacted their motivation. Activities that were perceived as enjoyable, such as team sports or group fitness classes, were more likely to encourage regular participation. Additionally, competition emerged as a motivating factor for some individuals, as it fostered a sense of challenge and achievement.

The second sub-theme focused on the perceived benefits of PA. Participants acknowledged various advantages associated with engaging in regular PA, including physical well-being, improved health outcomes and enhanced fitness levels. Additionally, the participants mentioned psychological benefits such as stress reduction, improved mood, increased self-confidence and the reduction of depression. The perceptions of these benefits acted as motivators, encouraging individuals to incorporate PA into their daily routines. Furthermore, the more participants recognised the positive impact of PA on their overall well-being, the more likely they were to participate in regular PA.

The third sub-theme explored the behavioural and psychological factors influencing PA attitudes, encompassing lack of interest, poor fitness, lack of skills, bullying peers, laziness (preference for sedentary activities) and fear of injury, which were identified as barriers to consistent PA engagement. Participants highlighted the need for flexible schedules and supportive environments to overcome these obstacles. Moreover, psychological factors, such as self-efficacy and intrinsic motivation, were found to be crucial in determining individuals' attitudes to PA. Those with a high level of self-

efficacy were more likely to believe in their ability to engage in and sustain PA. Intrinsic motivation, driven by personal enjoyment and fulfillment, was also identified as a key factor influencing PA behaviour (See Figure 6-2).

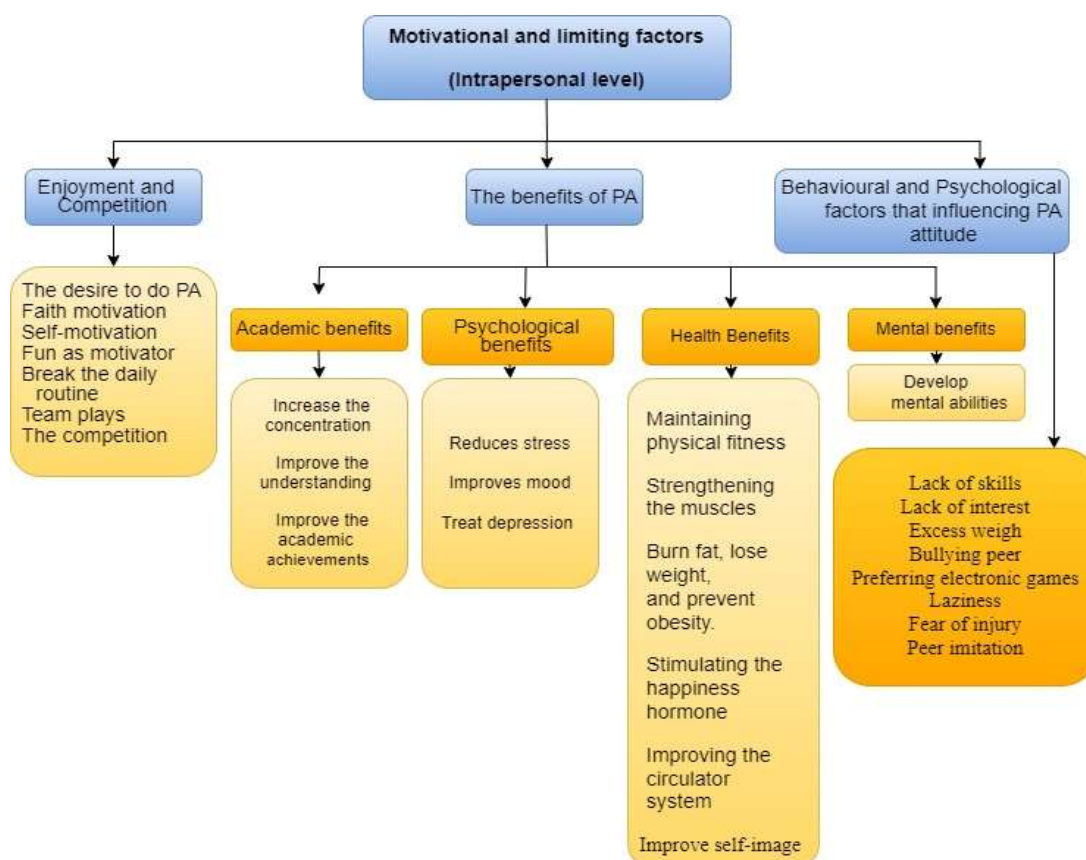


Figure 6-2 Theme one: Motivational and limiting factors and sub-themes

6.4.1 Enjoyment and Competition

This sub-theme illustrates the critical role that these factors play in promoting PA among students from both private and public school backgrounds. During the workshops and interviews, participants were asked to explain what they thought would help motivate them to participate in PA. Across the dataset, the most prominent motivation was personal desire and enjoyment, and the majority of teachers from both schools identified

competition and personal desire as vital catalysts for generating student enthusiasm. Furthermore, the narratives of the vast majority of male students at both schools demonstrated that their desire to select the type of activity was a major source of enjoyment and excitement.

“Competition creates enthusiasm among students”

(Teacher 6, private school).

“The first thing is the desire to do the activity and [that it will] make me excited while I do it”

(Student 7, public school).

Several teachers from the private school reported that male students exhibit enhanced commitment when engaging in physical activities of their preference, with the added element of competition further intensifying their enthusiasm.

“When students choose the activities they love, their commitment to doing them regularly increases. Adding a competitive element then fuels their enthusiasm even more”

(Teacher 1, private school).

“It is very, very important that I allow the students to practise the PA that they like. Your hand fingers are not the same, meaning that there is a student who loves soccer and another student who loves swimming, and so on”

(Teacher 5, private school).

Parents and some teachers also highlighted the importance of their children's choice and autonomy in relation to choosing the type of PA. They expressed that it would significantly encourage them to participate in PA. One father, for instance, stated:

“The most important point, and [one that] the school should be focusing on it, is to give each student his desire to choose the activity he loves according to his inclinations and desires, because this certainly helps children engage in physical activities”

(Father 2, private school).

“What excites students most is the desire and freedom of choice, and each student has special inclinations: some of them love soccer, some like to practise walking only and some of them like swimming. Therefore, it is necessary to give the student his choice and not force him to engage in a particular activity”

(Teacher 3, private school).

Faith motivation arose as a significant motivator. A few teachers from both schools utilised religious teachings as a conduit to emphasise the importance of physical strength and activity. The religious perspective was depicted as not only offering an understanding of the value of PA, but also inspiring students to view physical strength as a path to fulfilling their religious obligations. This perspective is illustrated through the following:

“It has a religious importance in our society: ‘The strong believer is dearer to God than the weak believer.’ I mean physical strength, a legitimate requirement”

(Teacher 3, private school).

“PA is significant, and our religion advises us to do activities, and in a *hadith* from the Prophet, may God’s prayers and peace be upon him. It means that movement is a blessing and that a healthy mind resides in a healthy body”

(Teacher 2, public school).

The final element was competition. The majority of male students from both schools expressed enthusiasm for competitive or challenging activities, especially team sports. Teachers also corroborated the motivational role of competition:

“The thing we are excited about is that there is competition”

(Student on Table A, private school)

“Competition creates enthusiasm among students”

(Teacher 6, private school).

Additionally, the appeal of prizes and contests to boost motivation was highlighted by another teacher:

“Prizes and competitions. These two things are significant and create enthusiasm among students”

(Teacher 5, public school).

In summary, this subtheme highlights how enjoyment, personal choice, faith, team sports, and competition serve as key motivators for engaging in PA. These elements encourage participation at an intrapersonal level.

6.4.2 The Benefits of PA

This sub-theme explores the participants’ perceptions of the advantages of regular PA, covering several aspects and highlighting the perceived benefits at different levels.

The first element examines the academic benefits of PA. Participants emphasised that engaging in physical activities can positively influence academic performance by increasing concentration, improving understanding, and enhancing academic

achievements. This suggests that PA not only aids the body but also has cognitive benefits that contribute to overall academic success.

The second element addresses the psychological benefits of PA, including stress reduction, mood improvement, and its potential use in treating depression.

The third element considers the health benefits of regular PA. Participants acknowledged that PA contributes to maintaining physical fitness, strengthening muscles, burning fat, and preventing obesity. Additionally, engaging in PA is believed to stimulate the release of 'happiness hormones,' improve the circulatory system, and enhance self-image, making these health benefits strong motivators for individuals to engage in PA.

The fourth element focuses on the mental benefits of PA, such as improved cognitive functions, including memory, attention, and problem-solving skills.

Regarding academic gains, participants shared their views on participating in regular physical activities. Teachers from both private and public schools highlighted the extensive benefits of PA, including its academic advantages. They noted that PA could help male students start their day with energy and vitality, thereby remaining more focused on their lessons. Public school teachers particularly pointed out a correlation between PA and heightened energy levels and clarity of mind, contributing to better lesson absorption. Furthermore, male students mentioned that beginning the day with PA helped them concentrate on their lessons, improved their academic achievements, and helped them avoid laziness and lethargy. For example, during a workshop at a private school, a group of students stated:

“When we walk, we are active and excited to absorb the lessons because walking activity activates our memory and keeps us focused on the lessons”

(Student on Table B, private school).

“You find him energetic, clear-minded and able to absorb lessons”
(Teacher 4, public school).

“I notice students who engage in PA demonstrate better focus and understanding in their academic work”
(Teacher 8, private school).

Parents also lent support to this observation. For instance, one father noted:

“Also, on the level of the student’s performance – I mean, let me give you an example: if the school day begins with a class of sports activity, this will have a positive impact on the student in terms of his understanding of the lessons”
(Father, public school).

The psychological benefits of PA were also emphasised. Participants, including teachers and parents from both schools, expressed that it helps reduce stress, improve mood and can even be used to treat depression. For instance, a teacher and a father from the private school shared their personal experiences and how PA helps them reduce stress and improve their mood for themselves and their children:

“Walking relieves stress, and I believe that it is one of the best ways to get rid of loneliness, especially since I am single and live by myself.
I get used to walking for half an hour to 40 minutes each day, and I find myself relieved from loneliness and return home in a good mood, so I think PA very, very important for everyone”
(Teacher 6, private school).

“I tried with my son. Sometimes, we walk in the early morning for nearly half an hour before he goes to school. By God, I have discovered that my son’s mood improves a hundred percent and he goes to school with a clear mind, as well as happy and active.”
(Father 5, private school).

Moreover, the data indicate that the majority of male students in both schools reported these psychological benefits, stating that PA helps them stay active and in a good mood, especially on days when they have a PE class, as opposed to other days.

Additionally, students shared their personal experiences in this context:

“For me, it is an important thing, and sometimes, when I go with my parents for a walk, I feel energetic and I go back home to study in a good mood and full of motivation”

(Student 13, private school).

“PA is important because it activates the mind, improves mood and reduces stress. We have noticed that, especially when the exercise class is in the early morning, we feel active for the rest of the classes”

(Student, private school).

“On the day when we have a physical class, we feel we are active and in a good mood, but on the days when we do not have a physical class, we feel bored and lethargic because we want to move and do sports”

(Student on Table C, public school).

Across the dataset, the most prominent benefits expressed by participants were in relation to health. Notably, virtually all staff members from both schools and the majority of male students mentioned the health benefits of engaging in PA, such as maintaining physical fitness, strengthening muscles and burning fat. They also identified that it stimulates the release of happiness hormones, improves the circulatory system and enhances self-image, all of which they considered as strong motivators for engaging in PA:

“PA is significant because it provides physical fitness, and for those who are getting older, their body will be healthy and fit”

(Student on Table D, private school).

“PA maintains physical fitness and body health and protects you, after God Almighty, from diseases”

(Teacher 5, public school).

“It also strengthens the muscles of the body and the muscles of the heart and makes the body continuously active”

(Student on Table A, private school).

“PA is important because it helps build the body and strengthen the muscles.”

(Students on Table C, public school).

It should be noted that some participants recognised additional benefits, such as weight management and obesity prevention, thereby aiding in avoiding obesity and facilitating weight loss. Furthermore, two teachers shared their personal experiences, illustrating how PA can significantly improve lives:

“I have a personal experience. I had an increase in triglycerides, and it reached a high level of 500 or more. One of the [things I had to do] was to adhere to a daily programme for a period of six months. The programme consisted of brisk walking each day for 45 minutes and sometimes cycling at home. Thank God, I lost weight and my psychological state improved greatly, and the tests proved that the triglyceride level returned to the normal rate, less than 200. Therefore, I can attest that PA is extremely important”

(Teacher 3, Private School).

“I was overweight at one point, with my weight nearing 90 kilograms. Thanks to God Almighty, and through exercising and walking, my weight dropped to 49 kilograms, without undergoing any surgical operation or anything else—just by brisk walking daily. That is why I highly commend the importance of sports”

(Teacher 5, public school).

“In my opinion, PA is crucial because it prevents obesity and is very beneficial for burning fat”

(Student 15, private school).

Finally, the influence of PA on self-image was also underscored. A group of male students stated:

“We do PA to care about our body and to avoid being obese”

(Student on Table B, private school).

The mental health benefits of PA were emphasised by some of the private school teachers and some male students in the public school workshop. They acknowledged the role of walking in managing conditions such as anxiety and depression, as well as enhancing overall mental well-being. One teacher shared his personal experience of how walking helped reduce his anxiety and increase his problem-solving ability:

“Look, sometimes when problems arise between me and my wife, I immediately get out of the house and go for a walk. Thank God, I discovered during the walk that the anxiety reduces and I begin to think deeply about solving the problem. Therefore, I very much praise the importance of sports, specifically walking”

(Teacher 8, private school).

Thus, as observed through the participants' responses, the benefits of PA—spanning academic, psychological, and health aspects—cover a wide spectrum. These benefits are well-recognised and valued, offering a compelling incentive for individuals to continue engaging in PA.

6.4.3 Behavioural and Psychological Factors Influencing PA Attitudes

This sub-theme explores the behavioural and psychological factors that affect individuals' attitudes toward engaging in PA. It includes eight elements identified from the dataset. The foremost element is the lack of skills. Participants reported that not having specific skills or knowledge in certain activities hinders their motivation to engage in PA. Male students mentioned feeling inadequate or unskilled as a deterrent from participating in PA. In workshops and interviews, participants identified barriers to PA participation, with the lack of skills emerging as a significant obstacle. Notably, students from the private school more frequently cited the need for specialist skills for activities like volleyball, basketball, and swimming than those from the public school. Teachers from both settings acknowledged this lack of proficiency in team sports, such as football and volleyball, as a barrier to student engagement in PA.

“We often feel left out in team games because we don’t have the basic skills to compete”

(Student, private school).

“We, here in the school, have many options in PE such as swimming, volleyball, basketball and tennis, but some students do not have the skills to play enthusiastically”

(Student, private school).

“In the PE class, we play football, but some students do not know how to play and the team is incomplete, and thus we sometimes cancel the match”

(Student, public school).

The second significant barrier identified was a lack of interest in physical activities. Participants highlighted that not finding activities that matched their interests greatly diminished their motivation to engage. In particular, male students from the public school pointed out the importance of having access to a variety of activities to sustain their enthusiasm and participation in PE. However, their options were limited, with football being the only sport offered in PE classes. This narrow selection did not cater to all students' interests, leading to decreased engagement. School staff members echoed this sentiment, noting that the preference for sports other than football was common among male students, yet the school's resources were confined to accommodating only football. This lack of diversity in PA offerings underscores the need for schools to broaden their PE programmes to meet diverse male students' interests.

“I hate playing football, and the school here only has football, so in PE classes, I sit and watch the students while they play”

(Student 10, public school).

“As a teacher, if I had many activities and options in this school, I would gather all the students, but I have only football and some students do not like that. So, what can I do in this case?”

(Teacher 6, public school).

Body weight and bullying by peers were identified as the third element influencing PA attitudes. A few male students mentioned that being overweight or obese significantly affected their motivation and confidence to engage in PA. The perception of physical limitations and concerns about judgment or negative experiences can deter individuals

from participating in PA, as well as bullying by peers. Students during the workshops discussed how experiences of bullying or negative social interactions related to PA could influence their attitudes and willingness to engage. A few teachers also highlighted that being obese or overweight discouraged students from engaging. Peer-to-peer bullying was highlighted as a significant factor influencing PA participation:

“Many students feel uncomfortable participating in school activities due to their extra weight and fear of bullying”

(Teacher 5, public school).

“Many students shy away from physical activities due to the fear of being bullied, particularly those who are overweight. The onus is on us, as teachers, to manage this”

(Teacher 4, private school).

“Older students often interrupt our games, demanding to join or they won’t let us play”

(Student on Table A, public school).

A high preference for electronic games was reported by parents, particularly by private school parents, who noted that their children prefer playing electronic games rather than doing any activity. They also highlighted that the availability and allure of electronic games competed with the motivation to engage in physical activities, especially due to their sedentary nature and an immersive experience. Additionally, students from both schools stated during the workshops that they prioritised electronic games because they were more attractive and competitive:

“I usually spend my day playing PlayStation and doing homework. I hardly find time for PA”

(Student 13, private school).

“In this era, most children are engrossed in mobile phones, social media and electronic games, [thus] drastically reducing their PA”

(Father 3, private school).

Laziness, or a preference for sedentary activities, was identified as the sixth element affecting attitudes towards PA. Participants recognised that a personal inclination towards inactivity, or simply a lack of initiative, could significantly diminish their motivation to engage in PA. This barrier was noted not only by a few teachers from both private and public schools but also by the male students themselves. For example, a student from the private school insightfully stated:

"Sometimes, it's not that we don't want to be active; it's just easier to do nothing when you're not already in the habit of being active."

(Student 6, private school).

“The first reason is laziness. For example, when I organise my time and schedule half an hour for exercise, I lie in bed, and when the time comes, I feel lazy and do not go”

(Student 11, private school).

“My enthusiasm for playing electronic games often results in me feeling lazy and unwilling to engage in physical activities”

(Student 3, private school).

“The thrill of progressing in my games leaves me too drained and lazy to do any PA”

(Student 8, public school).

The seventh element is fear of injury. Some male students expressed concerns about potential injuries associated with physical activities, which influenced their attitudes and willingness to participate. In addition, one teacher mentioned that he had a bad experience with one of his students breaking a leg during a football session, and that the student could not play again for a few years.

“Four years ago, during PE class [...] one of our students got injured and we called an ambulance. Later, it turned out that his leg had broken [the] student didn’t play soccer for three years because he was afraid of another injury, even though he was [very proficient] at soccer; therefore, these days, many students fear from injury”

(Teacher 9, private school).

“I avoid physical activities because I’m scared of getting hurt”

(Student 15, public school).

“Some students shy away from physical activities because they’re afraid of injuries”

(Teacher 4, private school).

The final element is peer imitation. Some students from both schools admitted that they were influenced by their peers’ behaviours, either positively or negatively. Positive peer role models encourage others to be active and enthusiastically engage in PA, while negative peers discourage their peers from being active. Students from both schools mentioned a lack of company for PA, i.e., a lack of peer interest. Also, a few teachers and parents from both schools mentioned that some students were influenced by their peer’s attitudes to PA. For instance, one father shared a personal story about his son and how he was influenced by his friends:

“On a personal level, by God, I suffer with my son. Sometimes, I tell him, let's go to the walkway. He says no, I will go with my friends. Let's go to the stadium, he says no, I will go with my friends. I mean, if his friends play, he plays, and if they want to play on the PlayStation, he goes with them...”

(Father 4, private school).

“Sometimes, we are swayed by our friends. If they aren't interested in participating, we end up following their lead”

(Student on Table D, private school).

“Some of the children, through my discussions with them, do what their peers do, such as sitting for a long time at home and being preoccupied with electronic games. This takes up a large amount of their time and is considered very negative. It should be paid attention to by researchers or specialists, and a solution to this problem should be found”

(Father 5, private school).

In conclusion, behavioural and psychological factors significantly influence attitudes toward PA among male students in both schools. The most prominent factors identified in the dataset include a lack of skills, a lack of interest, the presence of bullying peers, and a preference for electronic games. Other factors mentioned less frequently but still noteworthy are excess weight, a preference for sedentary activities (often described as laziness), and peer imitation.

6.5 Theme Two: Time limitations

This theme comprises two sub-themes, both of which act as barriers and limit male students from participating in PA. ‘Curriculum overload’ explores the challenges posed by a full academic curriculum that leaves limited time for PA. ‘Competing uses of time’ examines individuals’ difficulties in effectively managing their time to incorporate PA into their daily routines (see Figure 6-3).

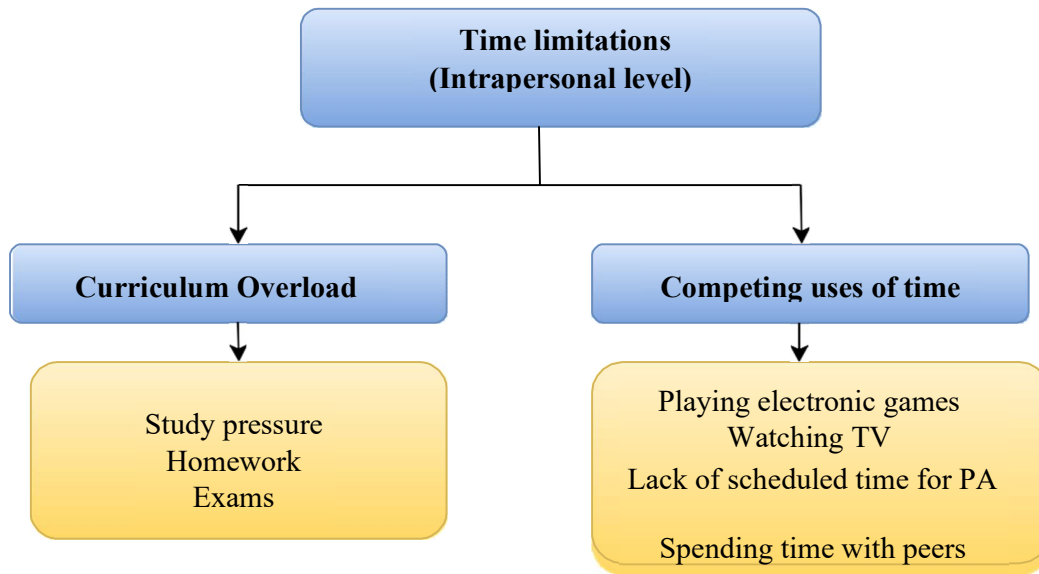


Figure 6-3 Theme two: Time limitations and sub-themes

6.5.1 Curriculum overload

This sub-theme illustrates the barriers impeding male students from participating in PA at the individual level. During the interviews and workshops, the participants were asked to outline barriers to participating in PA. The narratives of the vast majority of male students, especially from the private school, cited increasing academic workload such as study pressure, homework and exams. Furthermore, some parents from both schools favoured educational achievements versus participation in PA for their children. In addition, a handful of teachers stated that a loaded curriculum impeded male students' ability to do any PA:

“One of the barriers I see is the pressure of study and a large number of assignments and exams”

(Student14, private school).

“The problem is that the crowded curriculum leaves students with no time to engage in PA”

(Teacher 5, private school).

“Because we are busy with studying and exams, we cannot do PA”

(Student 6, public school).

“The pressure of studying and exams, and when I want to go to practise any activity, my father tells me to go and take care of my lessons”.

(Student 12, public school).

“The second obstacle, in my view, is the presence of academic and home pressures on children, such as exams and homework”

(Father 2, public school).

6.5.2 Competing Uses of Time

This sub-theme highlights the poor time management and the lack of allocated time for PA in male students' daily schedules, thereby representing a barrier to PA. Virtually all male students stated that they preferred electronic games and wasted substantial periods spent in front of a screen watching TV, playing PlayStation and browsing on smartphones and tablets. Furthermore, parents expressed their dissatisfaction with the situation:

“On the other hand, we now have a problem, which is the addiction to electronic games and spending a lot of time in front of the TV. Unfortunately, this did not exist before, and now it is overwhelming”

(Father 4, private school).

“Can we say that the children, in particular, this generation, are preoccupied with things other than PA. This is an important point, frankly, that a large percentage of children are obsessed with electronic games [...] and these things take up a very large amount of their time”

(Father 2, private school).

“Today, most children spend most of their time on electronic games, but it may become addictive for some. I mean, for example, my older son gets out of the house a lot and goes with his friends to sports clubs and so on, but my younger son is very attached to electronic games and plays all the time”

(Father 1, public school).

“For example, how can I allocate time for PA while I am at school all day long, and then, when I go home, I sleep in the afternoon and after that I do my homework and study”

(Student 8, public school).

In summary, as seen through the participants’ responses, study pressure, exams and homework were considered barriers to their participation in PA. In addition, the mismanagement of time and not scheduling PA in the daily routine were considered barriers.

6.6 Theme Three: Social Support

This theme investigates the role of support provided by different sources in facilitating PA and how it can influence – positively or negatively – students’ PA. This theme includes three sub-themes: ‘Parental support’ focuses on the influence of parents in encouraging and facilitating PA participation. ‘Peer support’ explores the role of peers/friends and social networks in promoting PA engagement. ‘Teacher support’ examines the significance of teachers’ guidance and encouragement in fostering PA among students (see Figure 6-4).

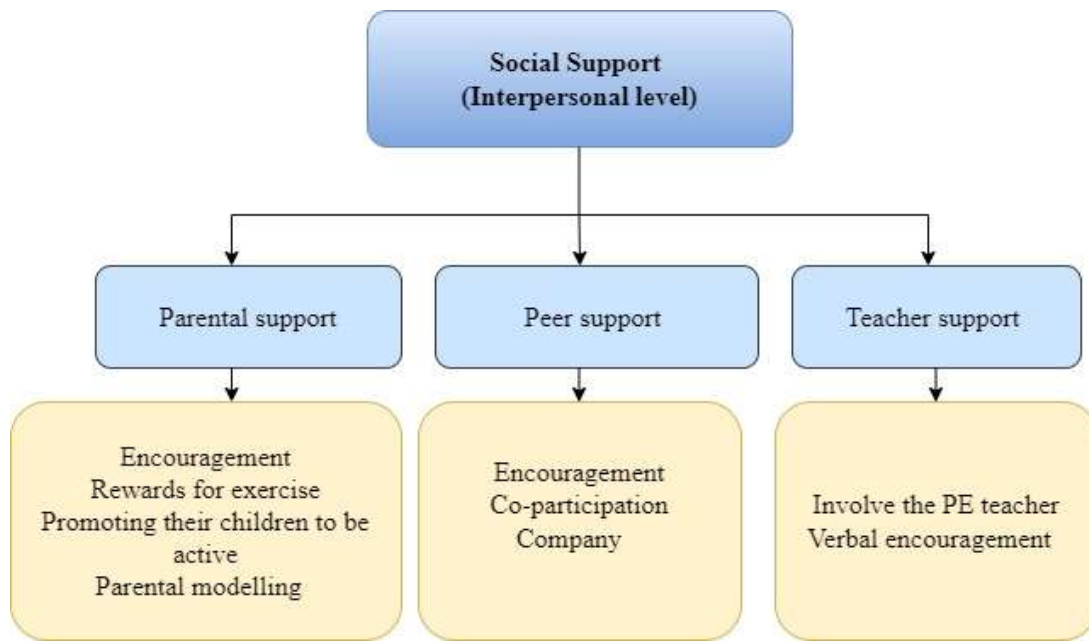


Figure 6-4 Theme three: Social Support

6.6.1 Parental Support

This sub-theme focuses on the influence of parents in terms of encouraging their male children to be active and facilitating PA participation. Active male students received support from their parents and family members, which was confirmed by teachers and parents during interviews. This support included encouragement, rewards for exercise and parental modelling. A few male students from the private school rather than from the public school stated they were encouraged by their parents to participate in PA three to four times a week, and it had become a habit. Some students from the public school stated they liked PA when their parents promised them rewards, thus motivating them accordingly. However, several teachers from both schools pointed out that insufficient parental support and a lack of awareness negatively affected children's involvement in PA, especially when some parents favoured educational achievements over participation in PA for their children:

“I always encourage my children to exercise, and I always make sure that they exercise at least three times a week”

(Father 1, private school).

“My father always motivates me and encourages me to participate in sports activities, and the best thing I love is when he gives me a reward for my participation in sports”

(Student 7, private school).

“Unfortunately, some parents do not cooperate with the school in this aspect. Rather, some of them consider the sports session a waste of time, and they’re indifferent to the importance of sports and the many benefits they bring. Let me give you an example: sometimes, the school holds evening activities and we invite all students to come and choose the activity that suits them, because the school is large, as you can see, and it has many resources, but on the other hand, we see that parents’ cooperation is weak in responding to such activities”

(Teacher 4, private school).

Notably, some male students at the private school emphasised that successful national athletes could serve as role models, potentially inspiring them to participate in PA. One student stated he loved sports because his father was a sportsman and that made him aspire to be like his father. Another student stated he loved to play football because he wanted to be a future Cristiano Ronaldo:

“There are a lot of things that motivate me to do PA, and the one most important to me is the encouragement from my parents, since my father is a sportsman and he enrolled in a big marathon event a few years ago”

(Student 1, private school).

“I am the one who loves football and I play every day with my parents and friends’ encouragement because I want to be like Cristiano Ronaldo in the future. Ask my friends, I am the best player in the school”

(Student 6, private school).

6.6.2 Peer Support

This sub-theme examines the role and influence of friends' and peers' support in promoting PA engagement. Many male students from both schools highlighted support from their friends and peers as a strong facilitator of participation in PA, especially in co-participation (playing together) or starting a new activity. This sometimes-involved verbal support. Furthermore, some male students at the private school mentioned that they engaged in PA primarily to socialize and spend time with friends, with some using this time to make new friendships, especially out of school time (neighbourhood friends). However, a few male students in the workshops highlighted that being lonely, having inactive friends, or having friends with other interests negatively influenced their participation in PA.

“The second thing that motivates me is the presence of friends, because when I exercise alone, I feel bored”

(Student 15, private school).

“To be honest, when we have companionship, and the more the number increases, the more fun and enthusiasm, and especially while we engage in any activity, we chat with each other and laugh. I love team activities”

(Student 12, private school).

“The thing that excites me is the presence of enthusiastic friends, because when one of my friends comes to me and tells me that sports are good, and let's go for a walk or any activity, I get excited about exercise”

(Student 6, public school).

Some parents and teachers had the same thoughts about peer support. Teachers at the private school noted that the lack of friends, or having friends who are inactive or have different interests, hindered male students from participating in PA. However, one father

mentioned that having friends who have negative interests (for example smoking) kept children away from practicing PA.

“Of course, as a teacher, I always notice the presence of enthusiastic students, especially in the PE class, who positively influence the rest of their classmates and always enthusiastically encourage the lazy ones and so on”

(Teacher 2, private school).

“I swear, children are always influenced by their peers. I mean, for example, now, if I give advice to my son and his classmate gives him advice, for sure he will take more notice of his colleague than me because they are adolescents. The same thing applies to PA. The boy who loves sports certainly encourages his colleagues to do so. And the lazy one will encourage the rest to be lazy. Also, some students have bad habits, such as smoking, while for sure will keep adolescents away from PA”

(Father 3, private school).

6.6.3 Teacher support

This sub-theme focuses on the significance of teachers’ guidance and encouraging male students to engage in PA, either by participating with them or encouraging them verbally. Many male students from the private school highlighted the importance of involving PE teachers in the PE session, as they can influence their participation positively, especially when they are supportive and enthusiastic. Some of them justified that by their love for the PE teacher, while some said they could learn from their expertise, especially in activities such as swimming, volleyball and tennis. This sentiment was confirmed by one teacher in the private school, noting that when he participated with students, he could see their obvious motivation, and so his job was to support, encourage and teach them. However, some male students at the public school

highlighted that a lack of support from PE teacher during PE sessions impacted negatively on their participation:

“The presence of the PE teacher with us during PA is very important and makes all of us keen to participate. But if he gives us instructions and leaves, some students sit down and do not participate”

(Student 4, private school).

“We love the participation of the PE teacher with us in class, especially if it is swimming or volleyball because he teaches us some skills”

(Student on Table C, private school).

“As a teacher, I love all of my students and consider them my children. I am always keen to participate in physical activities with them because I have noticed that their enthusiasm increases and they want to do so. So, I am here for them, supporting them and educating them – and that is my duty”

(Teacher, private school).

In the same context, parents recognised the importance of involving teachers in activities, and they mentioned the significance of encouragement, either tangibly, for example doing the activity, or intangibly, such as through praise or encouragement. Also, they stated that teachers can boost their children’s energy and attentiveness and reduce the amount of time they spend sitting down and not moving in PE sessions. Furthermore, it should be noted that one father suggested linking PA with marks to increase children’s participation in PE. In addition, other parents expressed that their children became excited when doing PA with their parents or a family member, especially if they were offered a financial or physical reward:

“The participation of the PE teacher with his students during PE classes is very important, as this helps encourage children to participate and increases their enthusiasm instead of sitting”

(Father 2, public school).

“If the PE teacher is keen to participate with his students in sports activities, this will have a direct impact on the participation of all students. I also suggest that if participation were linked to physical activities to certain degrees, for sure this would motivate students to participate”

(Father 1, private school).

“Previously, I have noticed when I encourage my son to get involved in any activity, or when I give him a reward for his participation in any PA, he gets excited about it. Therefore, the element of reward or encouragement for children is very important, especially at this age”

(Father 3, private school).

In summary, as seen through the participants’ responses, active male students had support from their parents, friends, peers and teachers. Parental support included encouragement, rewards for exercising and parental modelling. Friends’ support included companionship, co-participation, encouragement and playing together. Teachers’ support included involving PE teachers in activities and encouraging students. Also, it should be noted that some participants highlighted that a lack of support from friends, teachers and family members negatively influences children’s participation in PA and must therefore be considered a barrier.

6.7 Theme Four: Aspect of School Environment

This theme focuses on the organisational factors affecting PA participation, and it consists of three sub-themes. ‘Subject content and regulations’ examine how the content and regulations surrounding PE classes can either facilitate or hinder PA engagement.

‘School PE class’ explores the influence of the school’s PE curriculum and facilities on male students’ access to PA. ‘Inequality in accessing facilities’ addresses the disparities in using PA facilities among different schools (see Figure 6-5).

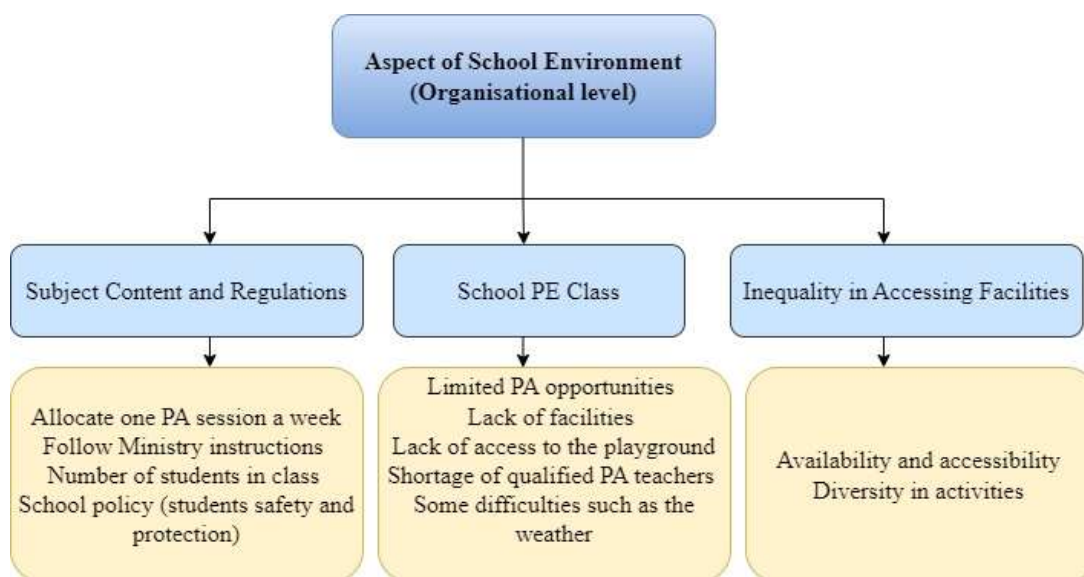


Figure 6-5 Theme four: Aspect of School Environment

6.7.1 Subject Content and Regulations

This sub-theme examines how the content and regulations surrounding PE classes can either facilitate or hinder PA engagement. The majority of male students and teachers from both schools highlighted that one session a week was not sufficient (45 minutes). Furthermore, some teachers highlighted that one session a week was scheduled by the Ministry of Education and they had to follow the Ministry’s instructions. Notably, one teacher from the private school argued about the practical time for the session, as it only totalled 30 minutes because 15 minutes were deducted from the session time for male students to change and then return to their class.

“Students have a weekly class for 45 minutes, but actually I consider it 30 minutes. As we know, students leave for 5 minutes then return to class for 5 minutes and they change their clothes for 5 minutes. All of these are deducted from the actual class time”

(Teacher 7, private school).

“There is a specific time for PA, which is a weekly class. The school is here for education, and the most important thing is the educational process and giving classes. As for it being only a weekly class for sports, this is a schedule that comes from the Ministry, and we must follow it”

(Teacher 7, private school).

It should be noted that the number of male students in each class is very important since a few teachers highlighted that a huge number of students was considered a barrier to accessing PA facilities. They suggested that 20 or fewer in each class would help in this regard:

“A large number of students in each class is a barrier since some classes have 40 students or more”

(Teacher 3, private school).

“Also, as a third obstacle, we have a large number of students in classes, meaning that some have 40 students and the PE class is 45 minutes, meaning an average of one minute for each student. How is it possible for a PE teacher to make all students participate in the activity? The number of students in classes must be fewer than 20”

(Teacher 4, private school).

6.7.2 School PE Class

This sub-theme examines the influence of the school’s PE curriculum on accessing PA. The PE session is sometimes the only opportunity for male students to engage in PA during school time. Teachers from the public school mentioned some factors limiting involvement, such as limited PA opportunities, lack of a competitive environment and lack of PA diversity. In contrast, teachers from the private school highlighted that the

diversity of PA opportunities, availability and accessibility were significant factors in facilitating PA among male students. In addition, many students from the public school highlighted some difficulties with the PE session itself, namely cancellation due to bad weather (too hot) – a sentiment shared by the PE teacher from the public school when he highlighted that hot weather hampered students’ participation in PA. He also stated that it was school policy to safeguard students in hot weather. Conversely, students from the private school did not complain about this issue, since they had an airconditioned playground and could practice PA at any time during the school day, which they considered a strong facilitator.

“As my colleagues mentioned, the main barrier is the high temperature, because I may get heatstroke”

(Student 3, public school).

“As you know, the weather here is very hot, especially in the summer, and that may reduce students’ participation in physical activities on a regular basis”

(Teacher 2, public school).

“If you go outside the walls of the school, you will find the situation very difficult and it is impossible to do any PA, even if we say after 9 am inside the school, it will be very difficult. I swear to God, the weather is hell, and the middle school students are teenagers and young children. From my point of view, they cannot bear the heat of the air. Also, those students are under our responsibility, and it is difficult to allow them to engage in any activity in the hot weather”

(Teacher 4, public school).

“The school here, praise be to God, is fully air-conditioned from entry to exit. Even the gymnasiums and playgrounds have been adapted, so sometimes the sports class is at 10 or 11 in the morning and we do not face any problems because the atmosphere is ready for students to practice any activity. This is something you will not see in other schools in Jeddah”

(Teacher 2, private school).

6.7.3 Inequality in Relation to Accessing Facilities

This sub-theme addresses the variations in PA facilities in terms of availability and accessibility between the two schools. During the interviews and workshops, the participants were asked to describe the types of PA in each school, how long it lasts and the types of facilities. All male students and teachers in the private school stated that they had one session a week for PA (45 minutes), encompassing multiple activities such as football, volleyball, basketball, tennis, swimming and gym. In addition, the school was airconditioned from the entrance to the exit, and they had three playgrounds; all these features are considered facilitators for PA. Conversely, participants from the public school stated the same time allocated for PA but they had only one playground where students could play only football. Notably, the playground at the public school was of low quality and needed maintenance. Participants from the private school considered the availability and accessibility of facilities, resources, and a good environment as facilitators for PA. Conversely, participants at the public school considered a lack of resources (financial and equipment) and facilities as barriers in this regard. A discussion between a group of students from a public school sitting at table B went as follows:

“We have football, and it is one session per week. There are no other activities”

“Ok, if you have one playground and it is worn out, how can you play other activities?”

“[Laughter] I don’t know”

(Students, public school).

“We have a range of activities in our school for students, such as football, basketball, volleyball and swimming. In addition to that, we have other games such as Ferrara, as well as artificial intelligence games such as Robot. These are games that develop thinking skills and help students develop their ideas”

(Teacher 4, private school).

“The unavailability of space is the first obstacle, and the second obstacle is the financial situation. In order to overcome these obstacles, I suggest that all teachers cooperate and collect a sum of money from everyone, and we maintain the playground to be suitable standard for students”

(Teacher 2, public school).

“Unfortunately, we do not have suitable facilities for any activities other than football. We have one playground and, unfortunately, it is not well maintained – you can see it if you want”.

(Teacher 4, public school).

Notably, parents of children from the public school expressed their dissatisfaction with the lack of availability of resources, facilities and equipment, for which they blamed the Ministry:

“School is supposed to provide various and different physical activities, because sometimes my son at home has little movement and the home environment does not encourage him to do activities, but the school where he spends a long time should provide different physical activities for the children”

(Father 2, public school).

“It does not have any equipment other than for football. In football, in fact, the light student is the one who participates and plays, while the fat one is either a goalkeeper or watches. He is deprived and poor, he himself plays, but he is not able to do so. The Ministry must provide the appropriate facilities and equipment for each school, as well as provide playgrounds for activities. These children are the pleasure of our lives, and they deserve every beautiful thing from us”

(Father, public school).

In summary, this theme has three sub-themes, namely subject content and regulations, school PE class and inequality in relation to accessing facilities. As seen through the

participants' responses, one session a week is not sufficient, and it does not even meet the PA threshold recommended for adolescents. Likewise, the huge number of male students in a class is considered another barrier to accessing PA. In addition, participants mentioned limited PA opportunities, lack of a competitive environment and lack of diversity in PA. Conversely, some factors did facilitate PA, such as the diversity of PA opportunities, availability, accessibility and having an air-conditioned playground.

6.8 Theme Five: Potential Approaches to Enhance PA

This final theme explores potential approaches to enhance PA in schools. It comprises three sub-themes that highlight potential interventions to promote PA at the community level. The sub-theme 'Role of Cross-Cultural Adaptation' focuses on participants' views regarding these specific programmes, including their potential adoption in KSA schools and the reasons behind their perspectives. 'The Role of Local Proposals' suggests programmes recommended by male children, their parents, and school staff to provide more opportunities for engaging in PA at the school level. The 'Role of Local Educational Authorities' underscores the importance of local educational authorities in implementing policies and programmes that encourage PA (see Figure 6-6).

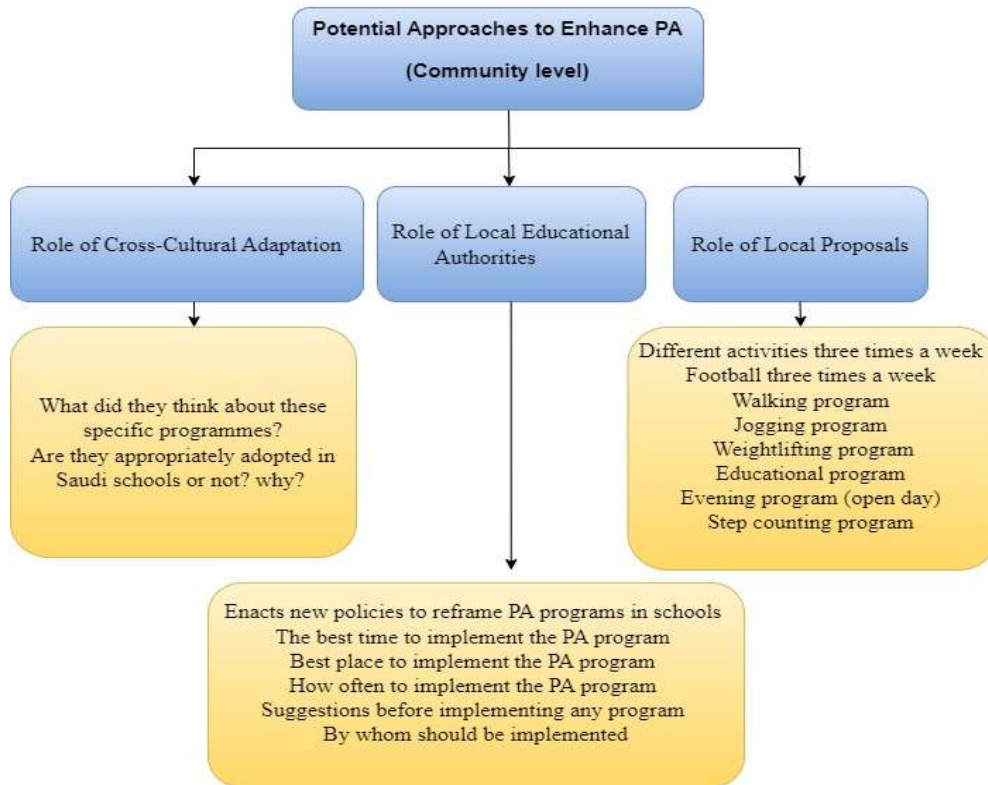


Figure 6-6 Theme Five: Potential Approaches to Enhance PA

6.8.1 The Role of Cross-Cultural Adaptation

During the interviews and workshops, male participants were presented with some examples of interventions that have been implemented in Arabic-speaking countries and internationally. These included educational programmes, TDM programme, a standing desk initiative, and the 100-mile club. Participants were asked to discuss the advantages and disadvantages of these approaches and to assess their potential applicability within their schools.

Beginning with the standing desk initiative, a majority of male students from both schools expressed their dislike of the idea of this programme, citing a lack of competitive or enjoyable elements. Additionally, some students could not envisage any benefits,

feeling that standing did not offer them any value. Another segment of students found the programme potentially boring and doubted it would lead to any positive outcomes. Contrarily, a few students suggested that making the programme optional could increase its appeal, highlighting a divergence in opinions among the participants:

“The programme in which the student is standing next to the desks I didn’t like it and I think it is not appropriate”

“Yeah, I agree with you, and I believe there is no motivation to do that”

“You are lazy [laughing], it’s a good programme for lazy people”

“For me, I think it’s difficult to stand during lessons, and I don’t think there are any benefits to doing that”

“Better to keep it optional for use. If we want to stand, then okay, but if not, we will sit”

(Students on Table B, private school).

On the other hand, teachers from both schools identified several challenges in implementing the standing desk programme, including financial constraints, lack of support, and insufficient equipment. Notably, one teacher proposed piloting this programme in a few select classes to assess its feasibility. This pilot should be conducted under the supervision of the Ministry of Education:

“Of course, the programme that you mentioned is beautiful, but to implement such programmes, equipment must be provided, and this equipment will cost the school a lot, so I think it’s too difficult to implement this programme in this school”

(Teacher 1, private school).

“I do not think that this programme is suitable for students, especially at this stage. It may be suitable for high school students or university students but not for teenagers. However, there is no objection to conducting an experimental study in some classes to see the extent of its usefulness. It is better for the Ministry to adopt the experience of such programmes”

(Teacher 9, private school).

The second example discussed was TDM programme. A majority of the teachers from both schools showed appreciation for the concept and deemed it suitable. Many teachers at the private school recounted their experience with a pre-COVID-19 initiative—a 10-minute morning walking programme within school premises. They highlighted several benefits: its ease of implementation, no need for special equipment, and the chance it provided to foster rapport with students outside the conventional classroom setting. Moreover, two teachers noted the walking programme as an excellent opportunity to address issues with certain students. Intrigued by these benefits, the researcher inquired why the programme was discontinued. The teachers explained that logistical challenges arose, such as time constraints affecting other subjects and difficulties integrating the programme into the existing curriculum. Additionally, some teachers were reluctant to reduce the time allocated to their classes. Concerns were also raised about the need for parental approval if the programme extended beyond school boundaries and the paramount importance of student safety.

At the public school, some teachers identified the climate, particularly Jeddah’s intense summer heat, as a significant obstacle to the program’s execution. Nevertheless, a proposal was made to conduct the programme early in the morning within school facilities to mitigate the weather issue. Furthermore, some teachers at the public school

highlighted insufficient space as another barrier, albeit the private school had access to enough spaces and a great environment (air-conditioned):

“The walking programme is very useful, especially as some students come to school early in the morning and can be sleepy. If we apply this programme in the early morning before classes, all students will be active, and it is better to apply it every day from half an hour to 40 minutes”

(Teacher 6, private school).

“We have previous experience regarding the walking programme, which was positive in some way. I mean, during the walking some students felt free to speak about certain issues and it was also good to build great relationships with them rather than in the normal classroom”

(Teacher 9, private school).

“The walking programme is very beautiful and has many advantages and disadvantages as well. One of its disadvantages is that there is a great responsibility on the teacher when taking all the students out of the school, because any student who gets into trouble is the teacher’s responsibility, and in order to implement a programme like this, we must reduce the time of classes and thus reduce educational attainment”

(Teacher 1, public school).

“The daily walking programme has its disadvantages; for example, the weather is hot and it is difficult to walk in hot weather. If we go outside the school, it is difficult because it is not a safe environment, i.e., a car might hit someone”

(Teacher 3, public school).

In the same context, the majority of male students from both schools expressed their enthusiasm for the programme, highlighting benefits such as the communal aspect of the activity, the opportunity it provided for social interaction, and the positive impact it had on their relationships with teachers. Furthermore, a student from the public school shared

a personal anecdote to underline his support for the program, drawing on his positive experiences of walking with his father:

“Honestly, I will give you my opinion. I see this programme as excellent and easy to do, and I think it’s applicable in our school because, as I mentioned to you, I always walk with my father and I see the benefits of walking by myself, so I see the walking programme as nice and applicable. I mean, the space in the school is not that large, but it is possible for every class to walk at a certain time”

(Student 4, public school).

“I agree with my colleague that the walking programme is good, because it is a group practice, meaning that we can all walk and talk with each other, and if the teacher walks with us, it is also better because the students get excited and something good happens for once”

(Student 5, public school).

“The daily walking programme is nice, but there should be a prepared place for its implementation, for example a large yard, and it would be better if it was air-conditioned so that it would be easy for us to implement it, because as you know here the weather is sometimes hot, especially in the summer. As such, it would be difficult to implement it outside the school or, for example, inside the school after the third class in the morning. It may be easy to apply in European countries, because I always see in movies that their weather is cold and they have rain, and this thing definitely makes them excited to walk”

(Student 7, public school).

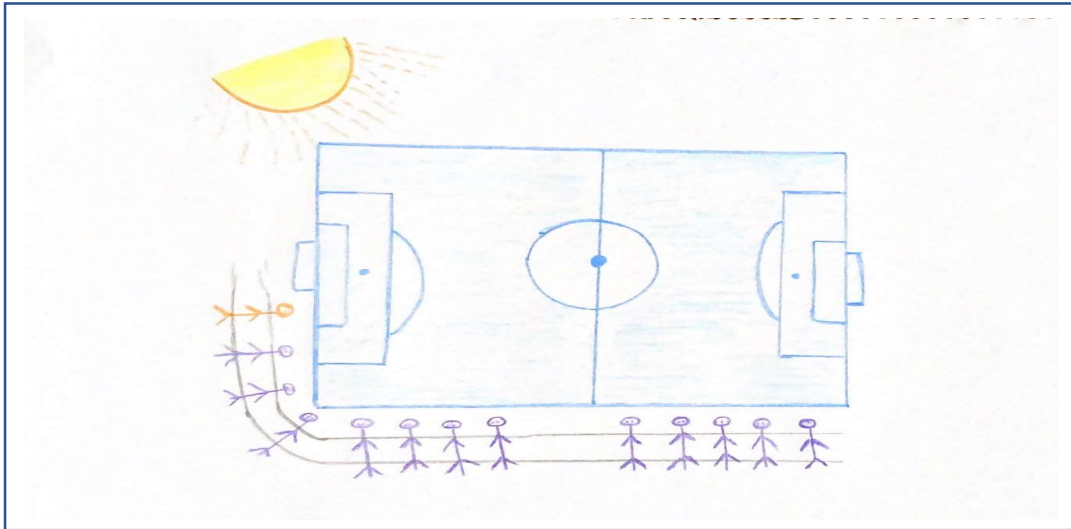


Figure 6-7: Student Group Drawing from Public School Workshop at Table C.

This drawing shows a playground at the center, surrounded by lines indicating that the male students prefer engaging in the activity two to three times, and in the presence of their teacher, who acts as a leader. Additionally, the sun drawn at the top of the page symbolizes hot weather as a barrier.

The third example concerns educational programmes, which some teachers and most parents praised as a way to educate male students about the importance of PA and the consequences of obesity, diabetes and other related diseases. In addition, a few teachers mentioned the lack of students' awareness of some basics, as some did not know anything about PF or how to measure their heartbeat and what these indicators mean. Therefore, they liked the idea of the educational programme, and they agreed it should be implemented to educate students at least about basic elements relating to PA. Moreover, a few teachers highlighted the significance of education before implementing any PA programme. This sentiment was confirmed by some parents from both schools, and they praised the importance of educating and promoting their children to be active

and aware of the benefits of PA. Notably, a few teachers suggested additional classes to help them teach the importance of various physical activities and their benefits, even if this occurred only once a week. It should be noted that one teacher from the private school mentioned their previous experience with an educational programme (obesity program) that was implemented before COVID-19, but it only lasted one week:

“Also, before the Corona pandemic, we applied a specific programme called the ‘Obesity Program’, and I was responsible for implementing it. It was informative and educated about obesity, the harm it can cause and the factors that lead to it, such as soft drinks, etc. This programme was implemented for one week for all intermediate school classes, and it was useful but quite short, I mean for one week”

(Teacher 1, private school).

“We also have some students who do not know the meaning of physical fitness and do not know how to measure heartbeats and what these indicators can tell us”

(Teacher 1, private school).

“Let me tell you something. We need an educational programme for students about obesity, its harm, sports, walking and its benefits so that students can be educated on these topics”

(Teacher 1, public school).

“I suggest that we add an additional class to educate students about the importance of activity and give them examples of the most important health benefits as a result of regular PA”

(Teacher 6, private school).

In the same discussion, numerous male students from both schools shared their enthusiasm for these programmes, specifying preferences for shorter sessions (10 to 15 minutes), once a week, and the inclusion of educational elements on topics like obesity and nutrition within the programme. Additionally, one student emphasised the value of self-study, suggesting the use of the internet or platforms like YouTube for learning at home:

“Educational programmes can be useful if, for example, the class lasts for the first ten minutes of teaching or educating about the importance of walking and sports and then we go to the playground and practice PA”

(Student 16, private school).

“[...] Today if we want to learn something, we can read it on the Internet or watch YouTube”

(Student, public school).

However, many students expressed their dislike of educational programmes, stating that they needed practice programmes rather than education, as exemplified in the following discussion:

“Educational programmes are good, but I feel that enough education should be a practice programme.”

“It's fine if it's short periods, not a full class.”

“I feel it has no benefit.”

“I agree with you, I feel that it is not suitable for the application.”

“It is true that we are tired of education and we need something like practice, i.e., an enthusiastic programme.”

“I agree with you, education is boring.”

“It is true that education is boring, and I do not see any benefit in it, because today if we want to learn something, we can read it on the Internet or watch YouTube.”

(Students Table C 8, public school).

In summary, this sub-theme discovered the role of cross-cultural adaptation and shed light on the advantages and disadvantages of different approaches in this regard. The idea of TDM or a 100-club programme was similar to what has been tried in the private school, and the advantage was that they were easy to implement, as no equipment was required. However, some disadvantages mentioned by the male participants included summer heat and the availability of enough space, especially in the public school. The standing desk programme was disliked by many participants because it requires the financial ability to buy equipment, albeit one teacher suggested it may be worth trying on a sample of classes to explore its feasibility. Finally, educational programmes were liked by teachers and parents and disliked by most students.

6.8.2 The Role of Local Proposals

This sub-theme highlights programmes proposed by male children, their parents, and school staff to provide more opportunities for engaging in PA at the school level. During interviews and workshops, participants were asked to describe their ideal PA programme for their school, including preferred timing, location (inside or outside the school), frequency, facilitators (school staff or external people), and the reasons behind their choices.

A prevalent suggestion from male students at both schools was to have "different activities three times a week". It was previously mentioned that students from both schools currently have only one session per week (45 minutes). Consequently, many male students from the private school expressed a need for three sessions a week instead of just one. Despite having great environments and facilities, the limited time (45 minutes) significantly hindered their participation in PA. Similarly, students from the

public school emphasised the same need, in addition to a desire for diversity in activities beyond just playing football, as exemplified in the following discussion:

“Look, we are supposed to have a PE session every day and a variety of activities”.

“It can be difficult every day, but let's say three times a week”.

“I agree with you three times, but the most important thing is that to be a variety of activities, meaning a soccer day, a walking class day, and a jogging day”.

“I agree with you, nice suggestion, but how can we have variety in activities and we have only one playground”.

“ I don't know, ask the researcher”

(Students on Table A, public school).

“All the examples you mentioned are good, but we are supposed to have a daily class, or at least three classes a week, of PE”

“It is true that they should provide more time for sports classes”

“Yes as we have beautiful facilities, playgrounds and a swimming pool, but time is very limited. It means one class per week. What can we do?”

“I agree with you, we have facilities, but there is no time”

“WOW, if they change the system and make it three classes a week, it would be enthusiasm”.

(Students on Table B, private school).



Figure 6-8: Student Group Drawing from Private School Workshop at Table B.

This drawing shows the schedule, and they placed three sessions a week. Also, they presented four different activities they wanted to do in each session: football, swimming, basketball, and volleyball.

Students who preferred 'different activities three times a week' suggested these activities be implemented inside the school and led by the PE teacher, rather than by individuals from outside the school.

“I suggest that it be three times a week, inside the school, and with the participation of the PE teacher”

“I agree with you, it should be applied by the PE teacher because we love him”

I agree with you, but it is better to be in the early morning so that we don't sweat too much”

“Right, in the early morning is better, because if we sweat, we have to take a shower, and the school here has no place for a shower”

(Students on Table A, public school).

On the other hand, teachers and parents from both schools expressed concerns that one session a week does not provide students with sufficient opportunities to engage in PA.

One teacher recommended offering PE sessions daily, while a father suggested at least two sessions a week to allow students maximum opportunity for activity.

“My own opinion is that the PE class is supposed to be on a daily basis”.

(Teacher 9, private school).

“In my view, it is not enough, and students need two or three classes per week”.

(Teacher 3, private school).

“The student in the intermediate school has tremendous capabilities and must unload them. What I knew from my son, there is only one activity which is football, so I see that there should be at least two to three classes per week for practising sports”.

(Father, public school).

The second suggestion, expressed by numerous male students from both schools, was for a "walking programme." This idea emerged after discussions with the researcher, with inspiration drawn from programmes like TDM and the 100-Mile Club. The proposed duration of the walking programme varied; some students recommended a daily half-hour session, while others suggested a 45-minute session three times a week. These students also felt that the programme should be conducted within the school and led by school teachers, with whom they are familiar and comfortable, although two students expressed a preference for external professionals to lead the programme, believing they could learn new skills from these experts. Moreover, a group of students from the private school suggested implementing the programme outside of the school grounds. Nonetheless, a few students mentioned that the choice of facilitator was not critical; what mattered most was that the programme operates under the Ministry's supervision. They argued that walking does not require professional instruction.

"I suggest that we have a programme for walking, inside the school and for an hour in the early morning. I mean, we walk here in the playground inside the school and to be three or four laps for all students, with the participation of the PE teacher".

"Yes, I wish to do that with our favourite teacher "PE teacher".

"I agree with my former colleague, that there be a daily walking programme, should be every day, and for all students, because walking once is useful and an easy activity, and it does not require anything from us other than determination. It is daily and inside the school. Duration, for example, from half an hour to 40 minutes".

"Agree with you guys but I prefer to be implemented by professionals from outside the school, we may learn new things, who knows".

(Students on Table C, public school).

"For me, I chose a daily walking programme, and it does not matter who will apply it, specialists or teachers because it is a simple sport and does not require training".

(Student, private school).

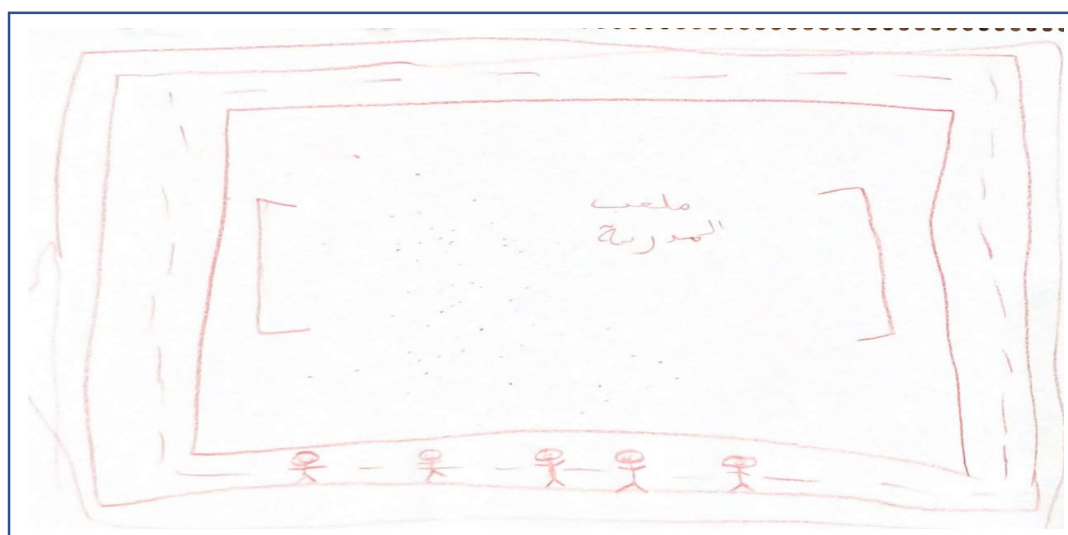


Figure 6-9: Student Group Drawing from Public School Workshop at Table B.

This drawing presented by four students and it features a playground in the centre, labelled in Arabic as "school playground." Around it, a line indicates that the students will enjoy walking around the playground.

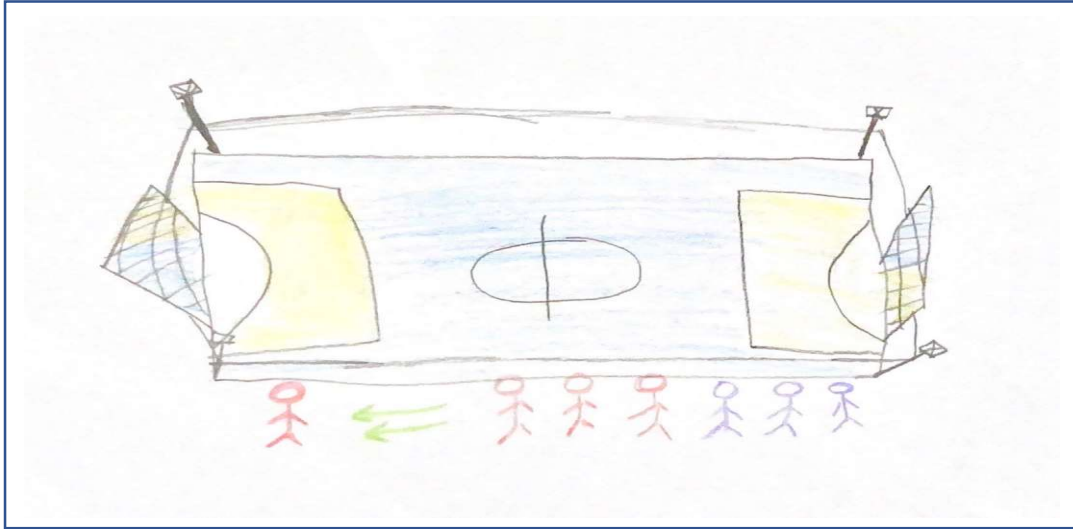


Figure 6-10: Student Group Drawing from Public School Workshop at Table D.

This drawing presented by four male students and it depicts a playground in the centre. The students are shown walking around the playground, in front of their leader (teacher) and they are behind.

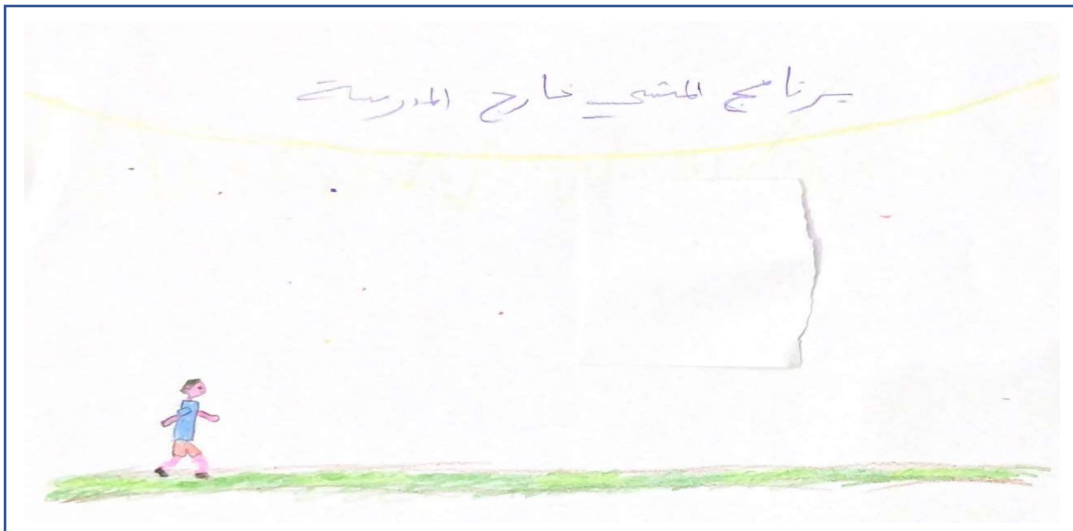


Figure 6-11: Student Group Drawing from Private School Workshop at Table E.

This drawing was presented by three male students and it shows a green path and a boy walking and is written in Arabic at the top (walking programme outside the school).

In line with the same theme, the walking programme emerged as the most popular suggestion among parents and teachers from both schools within the dataset. Teachers from the private school referenced their positive experiences with a similar programme, as mentioned in the preceding sub-theme. Notably, teachers from the public school recommended implementing the programme early in the morning inside the school premises to mitigate weather-related challenges. Opinions on the programme's duration varied, with some teachers advocating for 15 minutes and others for 30 minutes, to be conducted three to five times a week. The majority agreed that the programme should be led by school staff, citing concerns from some parents about the challenges of their children being instructed by external specialists. On the contrary, teachers from the private school were open to hosting the programme at any time during the school day, with durations suggested at either 30 minutes or a full class period (45 minutes).

“It is best to be applied by the school staff because it is difficult to supervise our children by someone from outside the school, even if they specialised in PA”.

(Father, public school).

“If I had the opportunity, I would choose a walking programme for the students, and the best, in my opinion, is that it be three times a week, and it is a full session, which means 45 minutes. Of course, it is better for it to be applied by us as teachers, because as you know, walking is very easy and does not need specialists, as well as it is useful for everyone”.

(Teacher 3, private school).

The third suggestion, made by male students from both schools, was to "play football three times a week." They described football as their favourite activity, highlighting its

enthusiasm, excitement, and challenge. Furthermore, several teachers and parents noted that football is the most preferred form of PA among the majority of students.

“I suggest that we have three classes a week to practice PA, and all of them will be football, because I love football, and this is my favourite thing”.

“Me too, I choose a football programme because we all love football and football is a team game and it is the sport that we all love. Better to be three times a week”

“I agree with you guys”.

“Like my colleagues, I choose football because it is a team game and a fun game that takes place inside the school and takes place two or three times a week is fine”.

(Students on Table C, private school).

“Look, no matter how many programmes there are, football remains the favourite game and the popular game for most students”.

(Teacher 9, private school).

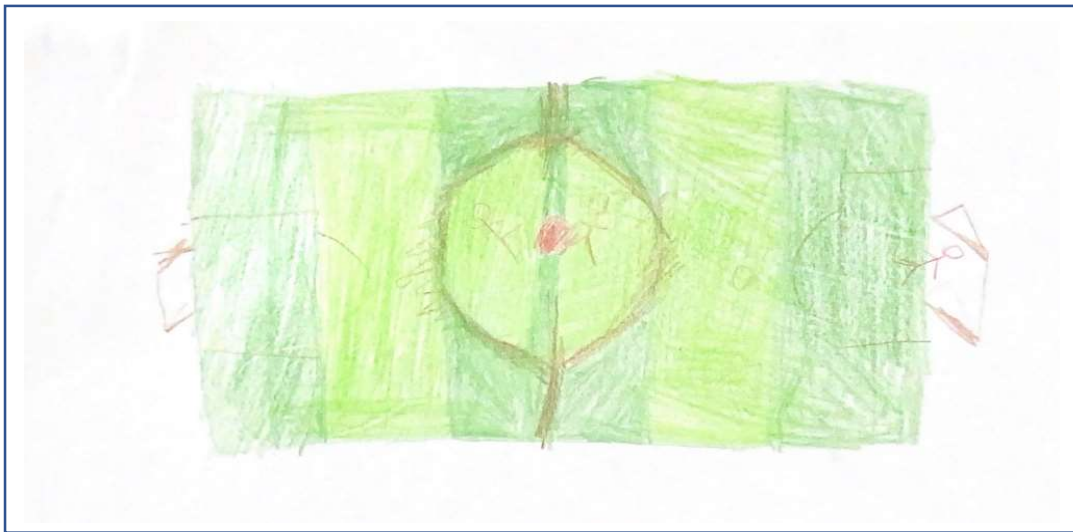


Figure 6-12: Student Group Drawing from Private School Workshop at Table C.

This drawing was presented by four male students and it shows the playground and students playing football.

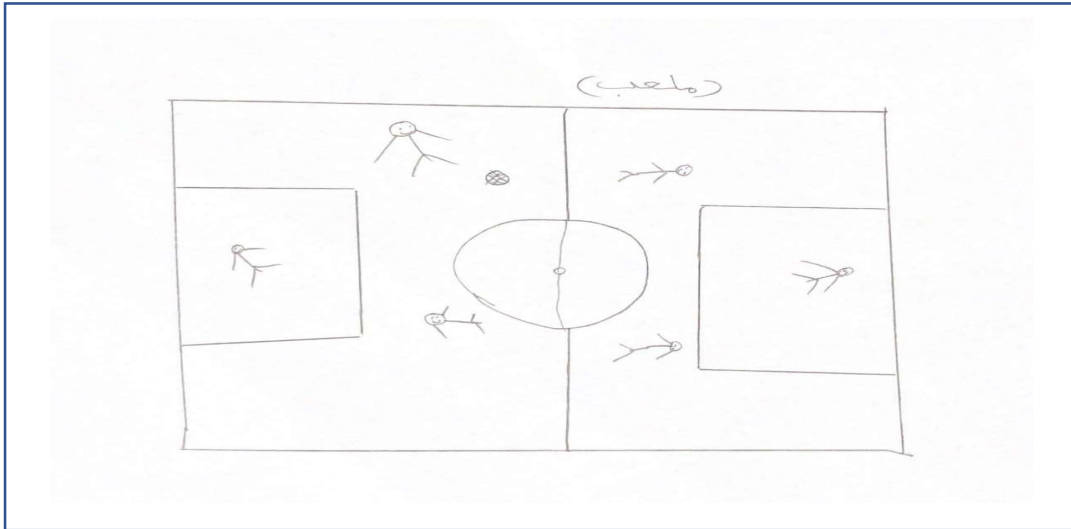


Figure 6-13: Student Group Drawing from Private School Workshop at Table D.

This drawing was presented by four male students and it shows the playground and students playing football and it is written at the top in Arabic (playground).

The fourth suggestion, put forward by a group of male students at the private school and supported by only one teacher, was for "a jogging programme." This idea was particularly championed by a few students who expressed a keen interest in incorporating jogging into their PE sessions. However, some of their peers countered that jogging lacks the enthusiasm and excitement found in other activities. Despite this criticism, the proponents of the idea remained enthusiastic, even creating a drawing to illustrate their vision for the programme.

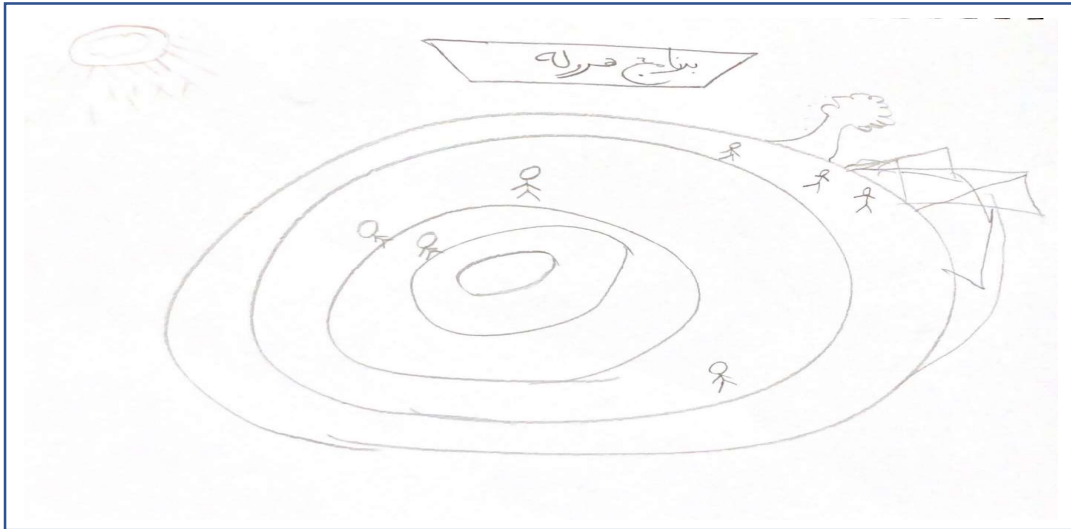


Figure 6-14: Student Group Drawing from Private School Workshop at Table A.

This drawing presented by four male students and it depicts students jogging in circles in open areas, with a depiction of the sun on the upper left, symbolising outdoor jogging within the school premises. At the top, "jogging programme" is written in Arabic. The students expressed a desire to participate in this activity two to three times a week.

The fifth suggestion, made by a group of students at the private school and one father, focused on "a weightlifting programme." This father, particularly enthusiastic about the Swedish weightlifting approach, argued that such a programme should be mandatory rather than optional for school children.

"If I were offered the opportunity, immediately, I would choose physical fitness exercise, "a Swedish programme", which is very important, especially for adolescents, because the physical loads of our children are almost zero. They do not have any physical stamina, and therefore I think that these exercises should be mandatory and not optional".

(Father 3, private school).



Figure 6-15: Student Group Drawing from Private School Workshop at Table F.

This drawing presented by three male students and it depicts three students training in the gym, lifting weights. At the top, gym equipment is shown, with one weight labelled 100 kg and another 8 kg. Additionally, the time for the session is noted at the top as from 9:30 to 10:30.

The sixth suggestion, brought up by only a few teachers from both schools, was for "an educational programme" that integrates theoretical learning with practical application. This approach involves educating students about PA before engaging them in practical exercises. The proposal includes dedicating the first ten minutes to education, followed by a session of PA—be it walking, running, soccer, or any preferred activity. It was suggested that school teachers could lead this programme if they possess the necessary training; otherwise, the school should consider enlisting professionals from outside who have the requisite experience. Furthermore, the teachers recommended scheduling this programme two to three times a week.

“I see that there is a need for PA with education. I mean, there should be an educational programme about walking and its benefits and so on. At the same time, we apply the walking programme, which means 10% of the class time is education, and then walking practice”.

(Teacher 6, private school).

“If I have the opportunity, I will choose an educational programme for weight loss for students who have obesity, and I can combine it with another programme so that means I educate students first and then allow them to practice”.

(Teacher 5, public school).

“Best applied during school time and two to three times a week. See if the schoolteachers are fully aware of the programme and are able to apply it, that’s ok. but if they do not have sufficient training, we can seek help from specialists from outside the school”.

(Teacher 5, public school).

The seventh suggestion, put forward by two teachers from the private school, was for "a step-counting programme." This idea emerged after the researcher presented examples of similar initiatives from Arabic-speaking countries and internationally. Reacting to these examples, the teachers advocated for creating their own programme. The first teacher recommended using a step-counting programme from Apple that tracks each student's steps, suggesting that the school could monitor the results weekly and offer prizes as an incentive for student activity. Meanwhile, the second teacher proposed a step-counting app that could be linked to school databases, displaying each student's PA level. This data could then help in tailoring the most suitable PA programme for the students. Importantly, both of them suggested to be applied by school staff but they should be trained very well before the implementation.

“All the programmes and examples that you mentioned are very beautiful in my opinion, but they may not suit us due to different customs and traditions. But why we don't choose a programme by ourselves, for example, there is a programme, which is a pedometer from Apple, we can use such a programme to measure the student's step counter for each week and reward the student who achieves the goal”.

(Teacher 1, private school).

“My idea is to have an app for the school to measure the number of steps, movement, and stair climbing, and it will be linked to a database so that we know the level of PA for each student. In the sense that you have data on which to base your choice of the programme”.

(Teacher 6, private school).

“It is best to be applied by school teachers because students accept their teachers more than a stranger and the response rate will be very high but teachers should get enough training before the implementation”.

(Teacher 1, private school).

The final suggestion, made by one teacher at the private school, was for "an evening programme (open day)." The teacher proposed that this programme be held in the evening, taking advantage of the longer available time to offer students a break from academic pressures. This programme aims to provide an enjoyable experience, particularly by allowing students the freedom to choose their preferred activities. Furthermore, the teacher recommended that it be scheduled three times a week, conducted inside the school premises but outside of regular school hours, and ideally led by school staff.

“If you leave the choice to me, I will choose an evening programme for the students, so that the students attend and practise all the activities they want. Why in the evening, because in the evening we have a long time and away from the pressures of school and the pressures of studying and such things. Why did I choose this programme? Because I saw students in another school attending in the evening on a weekly basis, and I noticed that it was a very wonderful social work, and the students were eager to participate”.

(Teacher 9, private school).

In summary, this sub-theme highlights the variety of activities suggested by participants from both schools, outlining preferred timings, locations, frequency, and facilitators for these programmes, aimed at increasing opportunities for PA at the school level. The most popular suggestions—namely, a walking programme, various activities three times a week, and football three times a week—received strong support from participants. In contrast, proposals for a jogging programme, weightlifting programme, educational programme, step-counting programme, and an evening programme were made by a smaller group of participants. It was clear from the responses that there is a consensus on the need for three PE sessions per week, with activities preferably conducted inside school premises and led by school staff. Additionally, there was an emphasis on the necessity for proper training of school staff to effectively implement some of these programmes.

6.8.3 The Role of Local Educational Authorities

This sub-theme emphasises the significance of local educational authorities in implementing policies and programmes that encourage PA in schools. During the interviews, male participants were asked at the end if they had anything to add. Some parents and teachers at both schools highlighted the importance of enacting new policies to reframe PA programmes in schools. As some parents from public school expressed

their dissatisfaction with the current situation in school regarding duration and types of physical activities. As some of them praised the importance of this age group and that children in this age need more time to do PA and a variety of activities needed as well. Furthermore, many parents praised the importance of societal awareness to promote PA and the urgent need for cooperation from all society members to encourage children to be more active. As one father expressed.

“Yes, regarding the PA, I wish the societal discussion was more serious and broader. Everyone surrounding the children must be involved, i.e. the imam of the mosque must talk about the importance of PA, as well as social media celebrities, celebrities of sports activities, and talk shows on television. I think we need this kind of attention and cooperation. They must focus on an important point, which is how to encourage children in schools to be more active.

(Father, private school).

“There should be new plans, and these plans are supervised and implemented by specialised people from the Ministry. It is useless to have a physical class and tell the students, “Come on, go and play football.”

(Teacher, public school).

“However, I advise all schools not to be limited to one PA type, but to diversify it. Students, especially at this age, have a great need to practice physical activities because this age stage is the basis for building. If the student gets used to practising activities at this age, he will continue and become a habit even when he grows up. Therefore, I see that PA, especially at this age, is very, very important”.

(Father, public school).

“If you notice, most of the students here are from poor neighbourhoods, and some of them cannot register in a sports club and pay 200 to 300 riyals as a monthly subscription fee. Therefore, the Ministry and local authorities must do their best to enact new policies for PA”.

(Teacher, public school).

In conclusion, this theme clarifies the values and priorities of various stakeholders in the context of enhancing PA in KSA school settings. Rather than delineating specific proposals, the findings shed light on the underlying factors deemed important by male students, teachers, and parents. These include the role of cross-cultural adaptation, the role of local proposals, and the role of local educational authorities in implementing such interventions. The responses indicate a broad consensus on the desirability of incorporating PA into school routines, highlighted by eight notable suggestions. Importantly, six of these emerged directly from the students, underscoring their active engagement and interest in shaping PA initiatives. The remaining two suggestions, contributed by teachers and parents, complement this picture by adding an adult perspective to the discussion. This collective input provides valuable insights into what might render specific recommendations more effective and acceptable within the educational environment of KSA.

6.9 Conclusion

This chapter has concluded the presentation and analysis of the qualitative findings from semi-structured interviews with school staff members and parents, as well as workshops with male students. Throughout this chapter, we have methodically unpacked the findings—beginning with descriptive data to provide a clear understanding of the demographics of the participants, followed by a TA of the interviews and workshops. These themes and sub-themes were organised in alignment with the SEM.

The subsequent chapter will present the rationale for conducting follow-up interviews, detail the recruitment and interview process, and present the findings from these follow-up sessions.

Chapter Seven: Follow-up Interviews

7.1 Introduction

The previous chapter presented initial findings based on data collected from school staff, male students and fathers. This chapter provides the rationale for conducting follow-up interviews, details the interview recruitment, data collection and analysis methods and findings.

7.2 Justification for Conducting Follow-up Interviews

Various strategies can be used to enhance the reliability of qualitative research (Bryman, 2016; Creswell, 2014). In this case, the researcher returned to the original participants from both schools to conduct follow-up interviews for two reasons: firstly, to validate the initial findings and ensure accurate interpretation. Secondly, to ask further about some issues that arose during the initial analysis and to gain a deeper understanding and clarify some points made in the initial interviews such as why children were more influenced by their fathers than other family members such as brothers, sisters or uncles; why the majority of participants did not like the idea of some programmes implemented internationally, such as the standing desk programme; why educational programmes were liked by teachers and parents and disliked by most students.

Sharing the preliminary findings with school staff in an accessible format during the follow-up allowed the participants to affirm, refute or elaborate on the results. This can serve as a member-checking strategy, enhancing the findings' accuracy and reliability (Guba, 1981). Researchers should perform this important step since it is considered one of the most important elements of credibility in qualitative research (Onwuegbuzie & Leech, 2007). Lastly, revisiting the same school staff facilitated assessing the

consistency of their perspectives over time, which can support the credibility and reliability of the study's results.

7.3 Recruitment Process

To initiate the follow-up interviews, the researcher first sought approval from the Ministry of Education in KSA for re-engagement with the two schools. After obtaining approval, the researcher reached out to the head teachers, extending an invitation for their staff to participate in the follow-up. Along with the invitation, the head teachers were provided with an invitation letter, a summary of the key findings, an information sheet and a consent form (a summary of the key findings and the invitation letter can be found in Appendix 11). From the private school, five teachers expressed interest in participating by responding to the researcher via email. However, four made no initial contact. A subsequent reminder was sent to these teachers, but they politely declined to participate. From the public school, four teachers showed interest in participating, whereas three did not respond to the invitation.

All interviews were scheduled via email and took place in September and October 2023. The interviews varied in duration, the longest being 48 minutes and the shortest 26 minutes, with an average length of 35 minutes. The interviews were conducted online in Arabic via Zoom and were audio-recorded for accuracy.

7.4 Follow-up Interview Process

The interview topic guide was informed by the initial findings presented in the previous chapter. The two objectives of the follow-up interviews were (1) to validate the initial findings and ensure accurate interpretation, (2) to discuss some issues that arose during the initial data analysis.

The researcher began the interviews by warmly welcoming the participants. This was followed by a detailed 10-minute explanation of the initial findings. Subsequent questions were asked as outlined in Table 7.1, recalling the ultimate goal of the study: to gain a comprehensive understanding of the barriers and facilitators of PA among male students from the perspective of school staff, parents and children, with a view to informing interventions aimed at promoting PA among this population.

Table 7.1: Topic guide for follow-up interviews

1	Does what I am telling you make sense? Would you like me to explain anything? What do you think about these findings? Do you think they are appropriate in your school and for your children? Do you think I have interpreted them correctly? Do you think anything important to children or their parents is not mentioned in my initial results? Do you want to add anything?
2	In this research, some participants thought that PA programmes from Western countries wouldn't be suitable for adoption in Saudi schools, such as the standing desk programme. What do you think about these?
3	In this research, educational programmes were liked by teachers and parents and disliked by most students. What do you think in this regard?
4	In this research, I found that children were influenced by their fathers. Do you think that other family members can influence children? Who? Why do you think that?
4	In this research, some issues were highlighted by participants, such as a lack of time for PA, and the importance of choice and competition in activities. What do you think about these?
5	What would you say to the people in the Ministry about allocating more time for PA and enacting new policies for PA? What would you advise them to do to help children be more active?

6	If you could choose one or more of these suggested programmes, what would you choose? Why? Do you think they are applicable in your school or not? Why do you think that?
7	Would you like to add or discuss any other points?

7.5 Follow-up Interviews Analysis

The researcher transcribed the follow-up interviews verbatim in Arabic on the same day or a few days after the interview, preserving participant privacy by ensuring no identifiable information was present. Subsequently, the transcripts were cross-checked against the recordings for accuracy, and any discrepancies were corrected. This was done by listening many times to the audio recording of each teacher and reviewing each transcribed interview. Then all interview transcripts were imported to MAXQDA software (Rädiker & Kuckartz, 2019) to enable the researcher to organise the data as used in the initial analysis. The codes were then grouped into comprehensive categories to achieve the objectives of these follow-up interviews. Quotes were provided, annotated by teacher number and school type. All data collected from these follow-ups were analysed thematically, following the approach for the data analysis explained by Braun and Clarke (2006). Notably, the researcher transcribed and analysed in Arabic to preserve the core meaning and then translated all transcripts into English for two reasons: to share these transcripts with the supervisor team and to extract quotes for the thesis.

7.6 Follow-up Interviews Results

The follow-up interviews were conducted with some of the school staff members at both schools: five teachers from the private school and four from the public school. The analysis of the data from this follow-up centred on two main objectives to achieve the

aim of this phase: (1) validating the initial results and ensuring accurate interpretation, (2) discussing some issues that emerged during the analysis of the initial findings.

7.6.1 Objective One: Validation of Initial Findings

This objective focuses on what participants thought about these findings and explores their appropriateness at the school and parent levels to determine whether the initial findings were interpreted correctly. All teachers from both schools expressed positive views about the initial findings and they thought that the findings were realistic, reliable and made sense. When the teachers were asked if they would like to add anything important to children or their parents that was not mentioned in the initial results, some highlighted the importance of the school environment in encouraging or impeding students' participation in PA, which is considered crucial, and that school management should focus on this.

“Yes, all the results are very clear and realistic, and all the points you mentioned make sense. I would like to point out a very important point, which is that the school environment varies completely from one school to another, and it certainly has a very clear role in enabling young people to be physically active or not; that is, when the environment is appropriate, it is prepared for students and ensures that all students participate in physical activities.”

(Teacher 3, private school).

The teachers were asked during the follow-up interviews whether they thought that the results were appropriate for children and their parents and if anything important was missing. All thought that the findings were appropriate. Furthermore, one teacher from the private school suggested sharing the findings with children and parents to explore what they thought. Notably, teachers from both schools widely believed that PA sessions in school should be mandatory for students.

“Yes, it is suitable for school-age students, from my point of view as a teacher, and if you find the opportunity to share these results with students or parents, I expect that you will hear the same response, and it is very appropriate.”

(Teacher 2, private school).

“Yes, I think you interpreted them correctly, based on the interview last year and what we have discussed.”

(Teacher 1, private school).

“From my point of view, you mentioned everything, may God grant you wellness, and I do not expect that there is anything important left that has not been mentioned. But I would like to add a simple point, which is that students should be forced to practice PA. As for the issue of the sports class being optional, I do not see that this is correct, and it must be compulsory for all students.”

(Teacher 2, private school).

“Yes, in my view, the results are very appropriate, especially since you included two important aspects. The first aspect is the enablers of PA and the things that help in PA, and the second aspect is the things that we can say reduce the practice of physical activities. I really liked the way you presented these results, and I think they are very suitable for school-aged children”.

(Teacher 3, public school).

7.6.2 Objective Two: Discussing Some Issues That Arose During the Initial Analysis

During the initial data analysis, the researcher noted some issues that arose, such as:

- Male students were more influenced by their fathers than other family members such as brothers, sisters, or uncles.
- The majority of male participants did not like the idea of some programmes implemented internationally, such as the standing desk programme, which they thought would not be suitable for adaptation in KSA schools.

- Educational programmes were liked by teachers and parents and disliked by most male students.
- Structural barriers existed, such as limited time for PA during the school day.

Most of the teachers from both schools thought that male students were always influenced by their fathers in the first instance but could be influenced by other family members when they received close attention from them. Furthermore, they mentioned that key factors in influencing children, such as guidance, attention and care from any family member, can greatly influence and impact children. Notably, one teacher from the private school mentioned cultural norms, such as that boys cannot express the influence of their mothers or sisters in front of their colleagues because this is considered shameful.

The poet says, “Our young boys grow up as their father did.” The son always sees his father as a role model. Therefore, the son always tries to imitate his father in many matters. If the father is interested in sports and encourages his son, you will find the son interested as well. As for other family members, yes, the son can be influenced by role models. I mean, if the son follows the example of his mother, brother, aunt, or uncle, he will certainly be influenced by them, but in the first place, the son is influenced by his father.

(Teacher 1, private school).

“Yes, of course, it is possible for a child to be influenced by someone other than the father. I mean, the father can be number one in influencing, but the role of the mother, brother and sister should be very important in influencing, but to be frank with you, it is a cultural issue. I mean, it is impossible for a student, while sitting with his classmates, to say to you, “I am influenced by my mother or my sister,” because he sees this as a shameful thing.”

(Teacher 2, private school).

“Look, a child can be influenced by the person closest to him, whether it is a father, mother, brother or anyone else. Whenever this child finds attention, guidance and advice, he will certainly be influenced by this person, but we always say that the child is influenced by his father because the son is always close to his father and mother, but the mother at home does not know about the child in school, what he plays, what he studies, who are his friends are, but the father is always the one who feels his son, you will always find that the son is directly influenced by his father”.

(Teacher 3, private school).

Notably, a few teachers in the private school highlighted that role models could be someone other than a family member, such as international footballer who may inspire male students to participate in PA. One teacher observed that some male students loved to play football because they loved an international football celebrity currently residing in KSA, and he noted that some students started imitating his movements during matches and wearing the same T-shirt.

“Can I add a point? We also found that some students are greatly influenced by famous footballers. For example, the famous football player Cristiano Ronaldo, as you know, now lives in KSA and plays with one of the local clubs. Therefore, we found many students wearing this player’s T-shirt and are influenced by him very greatly, even in their movements and love. Therefore, the role of celebrities is very great in influencing, whether positively or negatively”.

(Teacher 3, private school).

Some programmes were disliked by the majority of participants: most teachers from both schools provided similar responses in both rounds of interviews, and they still thought that the idea of a standing desk programme was undesirable and not welcome in their schools. Additionally, a few teachers considered standing as a kind of punishment for students. Furthermore, one teacher mentioned that they had received new guidelines from the Ministry of Education this year, prohibiting students from standing up during

educational lessons for any reason and that any teacher who violates this will be subjected to a penalty.

“Of course, not all programmes that have been implemented in Western or other countries are suitable for us, and I expect that you were asking us about our opinion with complete clarity and transparency. Therefore, we saw that such a programme is inappropriate and inapplicable in our school. For example, in the past and during class, when I have a student who is unruly, I let him stand up as a means of punishment. Therefore, I find such a program undesirable and unworkable”.

(Teacher 1, private school).

“I agree with them about this programme in particular. I do not think it is applicable, and if I had to decide, I would not allow it to be implemented in our school. It may be suitable for university students or adults, but not for intermediate school students. The students must be seated and comfortable in order to understand their lessons and focus with us. It is forbidden for children or teenage students to stand up in class, even for a few minutes, and I am against this idea”.

(Teacher 2, private school).

“The idea of a standing desk programme is not welcome because we, as teachers, consider a student standing during class to be a type of punishment. We also received a letter from the Ministry at the beginning of this year stressing and warning all teachers against students standing during educational classes, and whoever violates this decision will be subject to punishment. Therefore, I am not surprised that teachers, students and parents rejected the idea of this programme. Those students are teenagers, and it is difficult for them to stand during classes, even for a few minutes. My personal opinion is that this programme is not applicable in our school at all.”

(Teacher 3, private school).

Some educational programmes were liked by teachers and parents but disliked by most male students. Most of the responses in the follow-up interviews were similar to those in the initial interviews, with the majority of teachers at both schools praising the

importance of these programmes and their suitability to be implemented in their schools. They still thought that the programmes should be implemented to educate students about at least basic elements of PA. Additionally, they highlighted the importance of educating and promoting their students to be active and aware of the benefits of PA. Notably, some teachers from the private school mentioned the desire of male students to do practical activities rather than educational programmes; this did not surprise them since students in this age group like to do practical things rather than education. A few teachers suggested that integrating educational programmes with practical activities may be a suitable solution to make students love these programmes.

“The soul always accepts or denies things, and I still maintain my opinion that educational programmes are very beautiful, but students do not like them! This is an expected result, but from my point of view, such programmes should be mandatory for students because they have many benefits, even if they are for a short time. This means, for example, that students who suffer from obesity should have educational and promotional programmes. In addition to practice, and with time, the students will accept these programmes.”

(Teacher 1, private school).

“I see the idea of educational programmes as very beautiful, and I support such programmes, but students want something practical, they want practice programmes away from education. However, I would suggest that these educational programmes may be part of the sports class, meaning, for example, there will be 10 minutes of teaching and education, and after that, the students can go down to practice any PA they want. Another suggestion is to be a full session, but only once a month”.

(Teacher 2, private school).

“In terms of educational programmes, I find that they are very suitable because they are useful because they are educational, but, in fact, students may not want educational programmes because they are always looking for practice and actual programmes away from education, but it is possible to combine educational programmes with practice programmes, and so I expect that students will, with time, get used to and benefit from applying for such programmes.

(Teacher 3, private school).

Concerning structural barriers such as the limited time for PA during the school day, all the teachers from both schools still thought that the allocated one session a week was not sufficient (45 minutes). The majority suggested two to three sessions a week. Additionally, some suggested that the Ministry should devote more time to PA, which could be done by dedicating time from other subject classes or increasing the time of the school day. They justified this by the importance of PA and the wider benefits that male students could obtain by being active. Notably, a few teachers from the private school suggested cancelling the morning assembly, which is 15 minutes every day for traditional and boring exercises, and replacing it with a PA programme that is more competitive, unstructured and not boring.

“If it is possible for the Ministry to allocate additional time in the school day for PA, this will certainly benefit the students. Or as a second suggestion, the Ministry can reduce the time allocated for other classes and allocate this time to PA because, in my opinion, PA is much more important than some other subjects.”

(Teacher 1, private school).

“Let’s be honest, one session a week is not enough at all, and students in this specific age are energetic, and they need more time to release this energy in physical activities. So, I suggest the Ministry only has the solution either by dedicating time from other classes and giving this time to PA, or they can increase the school time from 7:30 to 3 p.m.”

(Teacher 2, public school).

“I propose to the officials in the Ministry to cancel the Tabour and replace it with a PA programme because the morning Tabour is 15 minutes, which has no value from my point of view because it is a traditional exercise that is boring and not useful for the students. Thus, we have benefited from 15 minutes of PA that benefits the students. I suggest an actual practical activity, such as a walking, running or jogging programme, especially since at the beginning of the morning, it will have a direct impact on the students, especially if all the teachers participate with all the students.”

(Teacher 2, private school).

Finally, at the end of the follow-up interviews, the researcher discussed with male participants what they thought were the possible implications of these initial results. Most praised the importance of this research for this age group. Some at both schools expressed interest in reading the final thesis in Arabic if possible. PE teachers from both schools highlighted the urgent need for similar studies to be conducted in this field, saying that they may consider the final results to develop effective programmes to improve their students' PA. Furthermore, some teachers were keen to know their student's opinions about what could make them happy to engage in PA, their desires and the most important motivators from their perspective. All of these factors would help teachers in designing PA programmes or at least discuss these factors with Ministry of Education policymakers in their regular meetings.

“Firstly, I am very grateful that you conducted this research on this age group. As you know, the teenage period is a very critical period, and we must deal with it carefully. Therefore, from my point of view, I see that the final results will be useful to us as PE teachers, and I personally have a desire to see the most important results that you will reach because it may help us a lot in designing PA programmes for our students. We may also discuss these results with officials in our ongoing meetings and take them into consideration.”

(Teacher 2, private school).

“Undoubtedly, these results are very good for PE teachers and for the school administration to reframe sports programmes. Unfortunately, I am not a specialist in physical activities, but I am very interested to see the impact of your results, and God willing, they will help improve the quality of physical activities if they are taken into consideration by officials.”

(Teacher 4, public school).

7.7 Conclusion

This chapter focused on the essential role of follow-up interviews in enhancing the credibility and depth of the study's findings. The follow-up interviews with school staff provided a crucial second layer of data, offering insights that confirmed and enriched the understanding of the initial results. These discussions allowed participants to reflect on the preliminary findings and contributed significantly to the validation process, ensuring the accuracy and relevance of the data interpreted.

Key findings from these interviews highlighted the influence of familial and cultural factors on male students' PA, particularly the dominant role of fathers in shaping their boy's habits. Teachers also expressed concerns about the suitability of internationally adopted programmes like the standing desk initiative, reinforcing the need for culturally tailored interventions in KSA schools.

The following chapter will elaborate on the final results, contextualising them within the broader literature, and will integrate the findings with the evidence base on the effectiveness of school-based programmes before conducting recommendations and implications for practice.

Chapter Eight: Discussion, Conclusion and Recommendations

8.1 Introduction

The preceding two chapters have presented the findings derived from the analysis of qualitative data, encompassing semi-structured interviews conducted with school staff members, parents and workshops with male students. Follow-up interviews were also conducted with schools' staff members from both schools. This chapter aims to contextualise these research findings within the broader literature and it contains five sections. The first section will briefly revisit the aim and objectives of the primary study. The second section will go through the key findings of this research, exploring how they align with or differ from previous studies and highlighting the novel perspectives and insights they contribute to the field, with a particular emphasis on the male focus of this study. The third section evaluates both the strengths and limitations of the research, including the implications of focusing solely on male participants. Following that, the fourth section will present implications for policy and practice, informed by the umbrella review and systematic review findings discussed in Chapters Three and Four, as well as insights from the primary research, while considering gender-specific factors. Finally, the fifth section will outline the contribution of the thesis and areas for future research that should be prioritised along with recommendations for both schools and policymakers, emphasising the need also to explore gender differences in PA promotion.

8.2 Research Aim and Objectives

The overall aim of this research was to explore with stakeholders the challenges and opportunities for school PA and recommend the development of future interventions

among schoolboys aged 13 to 15 years old from Jeddah City, KSA. The focus on male students was driven by cultural and social factors specific to the KSA context, where gender segregation in schools is the norm. To achieve this aim, the research was guided by the following objectives.

1. To explore the perspectives of school staff and parents on the barriers to and enablers of school-based PA among male students aged 13 to 15 years in Jeddah City.
2. To explore the perspectives of school male students aged between 13 to 15 years in Jeddah City and to generate participant-recommended strategies for increasing PA.
3. To explore the factors that might influence the implementation of interventions aimed at increasing PA in Saudi schools.

8.3 Key Findings

Effective Multicomponent Interventions: Systematic review in Arabic-speaking countries identified that multicomponent interventions that incorporate PA, nutrition, and education consistently show promise in increasing PA levels and reducing BMI in school-aged children and adolescents. This is especially when these interventions are tailored to the cultural context, as seen in Arabic-speaking countries.

Sustainability of PA Increases: The combined findings emphasise the importance of long-term, sustainable interventions in maintaining increased PA levels. Both the systematic review and qualitative research suggest that integrating PA into the school curriculum with sustained follow-up is key to long-term success, particularly in Arab-speaking regions.

Tailored and Contextualised Approaches: The qualitative research highlights the need to adapt effective international interventions to local contexts, which is supported by the umbrella and systematic reviews. In particular, addressing disparities in school resources and increasing parental awareness are crucial for the success of PA interventions in Jeddah and similar contexts.

Holistic Public Health Strategies: A comprehensive public health strategy that combines evidence-based interventions, sustainability efforts, and culturally appropriate adaptations is critical for enhancing youth well-being. The research collectively suggests that without such an integrated approach, the impact on public health, particularly in regions like Jeddah, may be limited.

This research was conducted in two contrasting schools, covering two different geographical locations in the Jeddah city in KSA. Sixteen school staff members from these schools were interviewed, and thirty-seven male students aged 13 to 15 from both schools also contributed to this research through a series of workshops. Additionally, seven parents participated in the study. Follow-up interviews were conducted a year after the initial data collection with a total of nine school staff members at both schools.

Employing a qualitative research approach, the primary objective was to explore the barriers and motivators influencing PA among school male students aged 13 to 15 years in Jeddah City, KSA. Themes were generated directly from the data and organised according to the SEM, based on the nature of the themes to reflect the different levels of the SEM. This organisation aimed to facilitate the comparison of the findings with previous studies in the wider literature. These barriers and motivators could be grouped into five overarching themes, each corresponding to specific levels within the SEM: two themes at the Individual level (motivating factors, and time limitations), one theme at

the interpersonal level (social support from various sources to facilitate PA), one theme at the organisational level (aspects of the school environment), and finally, one theme at the community level (potential approaches to enhance PA). Some of these themes comprise both facilitators and barriers to PA.

8.3.1 Intrapersonal Factors

Analysis of interviews and workshops uncovered two main themes at the Intrapersonal level: "Motivational Factors" and "Limitations in Time." The first theme comprised three subthemes: "Enjoyment and Competition," "The Benefits of PA," and "Behavioural and Psychological Factors Influencing Attitudes Towards PA." The second theme included two subthemes: "Curriculum Overload" and "Competing Uses of Time."

In the aspect of 'enjoyment and competition', this research identified positive expectations for PA at this level such as the desire to do PA, faith motivation, fun and breaking the daily routine, playing together (co-participation), and the importance of choosing the type of PA. These factors were significant facilitators encouraging male students' involvement in PA. In this research, competition emerged as a strong motivator for PA, as indicated by the majority of male students. However, research suggests that competition may not have the same motivating effect on female students, who might view competition more negatively or experience anxiety related to performance. Studies have shown that girls often prefer cooperative over competitive activities, which could lead to differing levels of engagement in PA (Biddle et al., 2019). This difference highlights the need for gender-specific strategies in promoting PA. Furthermore, some previous studies in the broader literature have regarded competition as a barrier to children's PA, particularly for girls and young individuals with physical conditions or lacking skills (Casey et al., 2009; Martins et al., 2015; Jonsson et al., 2017). This finding

can be explained by the fact that these male students having proficient skills or being in robust physical health, which allows them to take pleasure in activities that involve physical competition.

This finding is in line with a previous qualitative study conducted by Martins et al. (2018) aimed to explore and examine the viewpoints of physically active and inactive adolescents from various socioeconomic backgrounds and reported that having strong skills and physical abilities were considered PA motivators by young people.

Regarding the aspect of fun, there is substantial evidence indicating that fun is a fundamental characteristic of PA, acting as a mediator across various contexts and manifesting diverse meanings in different settings. Martins et al. (2015) conducted a thorough systematic review to investigate the barriers and motivators of PA as perceived by adolescents, analysing of qualitative studies conducted between 2007 and 2014. Their review identified fun as a significant facilitator of PA, particularly noted across multiple studies included in their review. Adolescents frequently cited fun as a primary reason for engaging in PA, emphasising that activities which were enjoyable were more likely to attract and retain their interest. This enjoyment was often linked to activities that involved social interactions, were less competitive, and allowed for some degree of autonomy and mastery. Moreover, their review highlighted that the absence of fun, particularly in structured or overly competitive environments, could act as a barrier to sustained PA. Activities that failed to provide enjoyment or were perceived as tedious or too demanding were less appealing to adolescents, underscoring the need for designing PA interventions that prioritise enjoyable and engaging experiences.

In the aspect of choice and autonomy, this research has revealed that the narratives of the vast majority of male students at both schools indicated a significant source of

enjoyment and excitement was their ability to select the type of activity. Additionally, parents and some teachers emphasised the importance of children's choice and autonomy in selecting types of PA. They expressed that this autonomy would significantly encourage participation in PA. These findings align with those of Martins et al. (2015), who identified autonomy as a critical facilitator of engagement in PA, suggesting that when adolescents feel they have control over their activities, their intrinsic motivation and commitment to participate increase.

In the aspect of "The Benefits of PA", the majority of male participants, including students, school staff, and parents, identified various academic, psychological, and health benefits as strong motivators for engaging in PA. These benefits include increased concentration, improved understanding, and enhanced academic achievements, psychological advantages such as stress reduction, mood improvement, and depression alleviation, as well as health benefits like maintaining physical fitness, strengthening muscles, burning fat, managing weight, promoting the release of happiness hormones, enhancing the circulatory system, and improving self-image.

These findings are in line with a previous qualitative study conducted by Bélanger et al. (2011) among adolescents which reported that a range of physical and mental health advantages were mentioned as reasons for engaging in PA. However, a systematic review by Martins et al. (2015) emphasised that adolescents recognise both the immediate and long-term benefits of PA, including mental health benefits and improved quality of life. The review further highlights that positive experiences in PE and perceived competence are crucial facilitators of PA, underscoring the importance of enjoyable and inclusive PA opportunities that can cater to these diverse motivators.

In contrast, our research identified several factors at the individual level that were considered barriers to male students' PA, such as a lack of skills, lack of interest in such activities, excess weight, laziness (preference for sedentary activities), and fear of injury. These findings align with a previous study conducted in KSA. Al-Nuaim et al. (2023) conducted a qualitative study to investigate the factors affecting youth engagement in PA across three different areas within the Al-Ahsa governorate, in the KSA and found that laziness, fear of injury and lack of skills were barriers to youth PA participation. Furthermore, our research results are consistent with a previous study indicating that young individuals in various countries participate less frequently in physical activities due to limited motivation, fear of injury, laziness, attitudes, and preferences (Koski et al., 2022). Additionally, factors such as peer bullying, peer imitation, and a preference for electronic games over PA were identified as barriers in this research, which, to the best of my knowledge, were not previously identified as barriers in previous qualitative studies. However, researchers have previously found that spending significant amounts of time in front of screens, including watching TV and playing electronic games, contributes to the global epidemic of inactivity in KSA and globally (Badawi et al., 2021; Bahathig et al., 2021; Alahmadi & Almasoud, 2023; Withall et al., 2011). These findings highlight the multifaceted nature of challenges students face in engaging in PA. Importantly, participants emphasised the need for flexible schedules and supportive environments to overcome these barriers.

Furthermore, this research identified study pressure, exams, and homework as barriers to students' participation in PA, along with time mismanagement and a lack of scheduling PA into their daily routines. Students struggle to balance academic commitments and PA, and the impact of curriculum overload on their ability to engage

in PA is substantial, warranting attention from policymakers and educators. These findings are consistent with a qualitative study conducted by Rajaraman et al. (2015), among South Asian adolescents, which found that academic pressures and a preference for sedentary recreational activities were barriers to adolescents' PA.

Time mismanagement continues to be a significant barrier to PA participation. This challenge is not unique to this research but has been consistently reported in the literature. For example, Safi et al. (2022) found that 80% of university employees cited lack of time as a primary obstacle to engaging in PA due to demanding work schedules and administrative responsibilities. Similar findings have been echoed across various settings, underscoring the pervasive impact of work-related time constraints on health behaviours.

Despite students identifying some PA motivators and barriers at the individual level, it appears that their current understanding and knowledge of PA, health, and fitness concepts remain limited. This finding aligns with the study by Marques et al. (2015), which examined the knowledge of PA guidelines among adolescents completing secondary school. The study found that only a small fraction of students (3.6%) could correctly identify all components of the recommended levels of PA, which includes the frequency, duration, and intensity of exercise. Similarly, Best et al. (2017) reported that while many young people were aware of PA guidelines, only 15.4% met these guidelines daily, further emphasising that knowledge alone might not lead to behaviour change.

These studies underscore the complexity of translating knowledge into action. Both Marques et al. (2015) and Best et al. (2017) suggest that while awareness of guidelines is necessary, it is not sufficient for ensuring that adolescents engage in adequate PA. This points to the need for educational and public health strategies that not only improve

knowledge but also address motivational and contextual factors that influence PA behaviour.

8.3.2 Interpersonal Factors

At this level, this research identified one theme that examines the role of support received from various sources in facilitating PA. This theme comprised three sub-themes: “Parental Support”: explores the influence of parents in encouraging and facilitating PA participation among their male children. “Peer Support”: explores the role of peer support and social networks in promoting PA engagement. “Teacher Support”: focuses on the significance of teachers' guidance and encouragement in fostering PA among male students. These factors highlight the relationships between students and the individuals who influence their behaviour, such as parents, friends/peers, and teachers.

Social support from various sources, including family, friends/peers, and teachers, has consistently influenced male students' engagement in PA, either positively or negatively. This support manifests in diverse methods, ranging from intangible forms such as encouragement, rewards for exercise, and parental modeling to tangible actions like co-participation and supervision by school staff, including PE teachers in activities. The findings suggest that boys are particularly influenced by the support and encouragement of their fathers and male teachers, consistent with literature that highlights the role of male role models in promoting PA among boys (Edwardson & Gorely, 2010). In contrast, research involving female participants often emphasises the importance of maternal support and the influence of female role models (Davison et al., 2003; Pugliese & Tinsley, 2007). These gender differences in social support should be considered when designing interventions to ensure they are appropriately targeted and effective.

In the private school, we have identified that social support from various sources, including family, friends/peers, and teachers, has positively influenced students' engagement in PA. This support provides encouragement, resources, and a positive environment for participation in PA.

Conversely, in the public school, students have concerns about the lack of support as some of them acknowledged that lack of support from friends, teachers, and family members impeded their participation in PA. This lack of support can result in lower motivation and fewer opportunities to engage in PA. While students might not explicitly understand the benefits of support they never received, their feedback indicates that feeling unsupported is a significant barrier to participating in PA. This demonstrates the crucial role that social support plays in influencing students' engagement in PA.

Moreover, the absence of supportive peers or association with friends who engage in negative behaviours, such as smoking or physical inactivity, may further diminish boys PA engagement as mentioned by some parents. Additionally, insufficient support from parents and a lack of awareness had detrimental effects on children's PA participation, particularly when some parents prioritised educational achievements over PA for their children.

These findings align with a previous qualitative study conducted by Bélanger et al. (2011) among adolescents to investigate elements that influence both the continuation and decrease of PA during adolescence. They found that adolescents became physically active when they received parental support including participating in sports gatherings and offering support and motivation. Furthermore, they found that lack of support from parents or peers diminished participation in PA.

8.3.3 Organisational Factors

At this level, this research identified the theme, ‘Aspects of School Environment’, which focuses on the factors influencing participation in PA and consists of three sub-themes: ‘Subject Content and Regulations’ examined how the content and regulations surrounding PE classes can either facilitate or hinder PA engagement among students. ‘School PE Class’ explored the influence of a school’s PE curriculum and facilities on students’ access to PA opportunities. ‘Inequality to Access to Facilities’ addresses the disparities in accessing PA facilities among different schools, highlighting issues of equity in providing access to resources for PA engagement.

To understand the factors influencing PA, various theoretical frameworks have been employed, with ecological models highlighting organisational factors as potential influences on adolescent PA levels. Given children's relatively limited control over their behaviour, understanding such factors is crucial, as they are particularly susceptible to organisational or environmental influences (Crespo et al., 2013). Moreover, numerous studies have indicated that interventions targeting organisational or environmental factors, alongside individual and interpersonal factors, tend to be more effective (Heath et al., 2012).

This research identified the significance of school PE classes as a great opportunity for students to engage in PA. These findings align with previous studies, including one conducted in Morocco of a similar age group (13 to 15 years old), which reported that PE classes contribute to enhancing students' overall PA levels (Abdelghaffar et al., 2019). However, our findings revealed challenges within PE classes themselves, notably session cancellations due to adverse weather conditions (extreme heat), lack of PA variety, inadequate equipment, and a shortage of qualified PA teachers. These factors

led to decreased participation in PA, with extreme heat during the summer period frequently cited as a barrier to outdoor PA. While previous studies have explored the influence of the built environment on adolescents, weather-related factors have received less attention (Brockman et al., 2011). For instance, in the UK and the US, adolescents tend to engage less in outdoor PA during the winter season due to cold weather (Carson & Spence, 2010), this indicates the importance of weather in PA participation.

The reduction in adolescents' PA may be exacerbated by extreme heat during the summer months in the KSA, which limits opportunities for outdoor physical activities. Similarly, subject content and regulations played a significant role in examining how the content and regulations surrounding PE classes can either facilitate or hinder participation in PA. The majority of participants from both schools emphasised that one session per week, lasting 45 minutes, was insufficient. They also highlighted the time deducted from the session for students to change and return to their classes, a sentiment echoed in a similar study conducted in a different region of KSA among the age group of 15 to 19 years old (Al-Nuaim et al., 2023). Indeed, this allocated time for PA is far short of meeting the PA guidelines suggested by the WHO for adolescents, which recommends that children and adolescents aged 5-17 should partake in a minimum of 60 minutes of PA daily (WHO, 2020). Additionally, some participants raised concerns about the large class sizes, with some classes accommodating up to forty students. This overcrowding poses another barrier to accessing PA facilities, as larger class sizes limit student attention and space for physical activities. Conversely, smaller class sizes can lead to better engagement and participation in PA. Smaller groups of students often allow for more individualised attention from PE teachers, which positively impacts students' motivation and skill development in PA (Brabo, 2014; Hattie, 2005)

The final sub-theme within the organisational level centered on inequality regarding access to facilities, which elucidated the disparities in PA facilities' availability and accessibility between the two schools. A comparison between the public school situated in a deprived area and the private school located in an affluent area revealed differences in spaces, facilities, and types of PA offered. The private school offered various activities such as football, volleyball, basketball, tennis, swimming, and a well-equipped gym. Additionally, the entire school premises were air-conditioned, and they had three playgrounds, all of which are considered facilitators for PA. In contrast, the public school had only one playground in poor condition, necessitating maintenance, and students' activities were limited to football (soccer) alone. Consequently, students in the private school enjoyed readily available and accessible facilities, resources, and a conducive environment, which served as strong facilitators for PA. Conversely, students in the public school were deprived of these advantages and cited the school environment and policies as hindrances to PA engagement. This deprivation experienced by the public school students has been echoed in a similar qualitative study conducted in the Eastern province of KSA (Al-Nuaim et al., 2023).

The findings from the umbrella review (see Chapter Three) underscored the feasibility of schools providing broad opportunities for adolescents to engage in PA during various school activities such as PE classes, recess periods, and commuting to and from school (Campos-Garzón et al., 2023). However, the majority of participants, especially students and parents in the public school, expressed dissatisfaction with the facilities, equipment, and lack of spaces and diversity in activities at the school. A previous systematic review indicated that the availability of sports equipment and the condition of school

playgrounds are associated with the PA levels of children and adolescents, emphasising the pivotal role of school sports facilities (Morton et al., 2016).

8.3.4 Community Factors

Within this level, the final theme has been identified 'Potential Approaches to Enhance PA', which contains three sub-themes highlighting potential interventions aimed at enhancing PA: "The Role of Cross-Cultural Adoption" which explores participants' perspectives on the suitability of specific PA programmes from Western countries for adoption in KSA schools. "The Role of Local Proposals", proposes programmes suggested by children, their parents, and school staff to provide more opportunities for students to engage in PA, considering the diversity of activities available. "The Role of Local Educational Authorities", emphasising the significance of local educational authorities in implementing policies and programmes that encourage PA.

Some programmes, such as the standing desk programme that has been positively evaluated by Guirado et al. (2021) were unpopular with many participants. Students expressed that the programme lacked elements of competition or enjoyment, and they did not imagine any benefits from it; standing seemed meaningless to them. Meanwhile, school staff from both schools mentioned potential challenges they might face in implementing the programme, including financial constraints, lack of support, and inability to acquire the necessary equipment. Moreover, follow-up interviews revealed that teachers from both schools still held unfavourable views toward the standing desk programme. Some teachers even viewed standing as a form of punishment for students, and one teacher mentioned receiving new guidelines from the Ministry of Education prohibiting students from standing during educational lessons. This perception reflects a deeper issue, possibly close to workplace scenarios where sitting is traditionally

associated with productivity. Research in workplace settings by Mackenzie et al. (2019) and Hall et al. (2019) suggests that sedentary behaviour is often culturally linked to professionalism, suggesting a similar mindset may influence educational settings, where sitting is equated with attentiveness and good behaviour. However, these findings contrast with those of the umbrella review presented in Chapter Three. A systematic review by Guirado et al. (2021) indicated that using active desks in classrooms could enhance health outcomes for school-aged children. The review included a study showing a notable reduction in BMI percentile (-5.24) for the intervention group versus the control group after a two-year period. Additionally, six studies noted a substantial reduction in sitting time during school hours for those in the intervention group. Furthermore, several studies noted a marked rise in MVPA following the intervention. The review also highlighted significant increases in standing time reported in nine studies, and two studies demonstrated improved academic performance in the intervention group (Guirado et al., 2021).

The idea of TDM bears similarities to initiatives implemented in the private school, offering the advantage of the ease of implementation without the need for equipment. However, participants highlighted certain drawbacks, such as the challenge of coping with summer heat and the availability of sufficient space, particularly in the public school. These findings align with a prior study conducted in the UK by Malden et al. (2019), which identified adverse weather conditions and space limitations as barriers to children's participation in TDM programme. Some schools in that study were unable to adopt the programme due to insufficient space and inadequate surfaces. Hence, it underscores essential prerequisites for schools considering implementing a walking programme, including ample space, conducive environments, and enthusiastic,

supportive teachers, factors that could enhance student participation (Malden et al., 2019).

Evidence from the umbrella review in Chapter Three, encompassing two systematic reviews that positively evaluated TDM, indicates its promise in increasing PA, with significant improvements observed in PA, PF, and MVPA. Long-term engagement in TDM has been associated with an increase in MVPA by nearly ten minutes daily, positively impacting PF (Breslin et al., 2023). This increment surpasses those observed in other PA interventions, further suggesting the program's potential to fulfill the public health recommendation of 60 minutes of MVPA daily for children.

Educational programmes were generally favoured by teachers and parents but received less enthusiasm from most students. Some teachers from both schools proposed allocating specific time in the school curriculum for PA education, recognising its potential to enhance children's understanding of the broader benefits of PA. However, RCTs conducted in Spain in 2019 for adolescents in intermediate school suggested that educational programmes did not lead to a significant increase in PA. However, findings from the umbrella review in Chapter Three and the systematic review in Arabic-speaking countries in Chapter Four indicated that educational programmes focusing on PA, diet, and education could potentially increase PA and decrease BMI among school-aged children. Particularly, a systematic review conducted by Moeini et al. (2021) demonstrated that educational interventions had a statistically significant effect on weight loss, with the intervention group experiencing a weight loss of 1.02 kg (95% CI: 0.22–4.79 kg) compared to the control group. Additionally, using combined interventions for an extended period showed greater effectiveness than one-dimensional interventions. Furthermore, as discussed in Chapter Four, the analysis of long-term

interventions revealed that those interventions exceeding three months resulted in sustained PA levels, and long-term educational programmes showed promise for increasing PA and reducing BMI among school-aged children and young people.

The second sub-theme identified within the community level was ‘The Role of Local Proposals,’ which highlighted some programmes suggested by children, parents, and school staff to provide more opportunities for engaging in PA at the school level. Analysis of workshop transcripts and drawings revealed that the majority of students from both schools preferred three types of programmes: a walking programme, different activities, or football. The walking programme seemed to be inspired by the idea of TDM, with students from the private school having previous experiences with a similar programme. They expressed a strong desire for the programme to be implemented inside the school-by-school staff members. The suggested duration of the programme varied among students, with some suggesting it be half an hour daily and others proposing one session (45 minutes) three times a week. Furthermore, during the workshop, a group of students drew a picture to illustrate their preferences (see Figure 6-7 in Chapter Six). Notably, TDM was established in the UK in 2012 for 15 minutes and has been widely adopted worldwide, with over 15,600 schools and other settings implementing it (Breslin et al., 2023). However, as noted by Pearson et al. (2020), interventions developed elsewhere may not be directly applicable to GCC countries and particularly in KSA due to unique climatic, social, and cultural factors.

The second most prominent suggestion by the majority of students was to have "different activities three times a week." For these students, the preference was for these activities to be conducted inside the school and led by the PE teacher rather than external individuals. However, a significant challenge is that intermediate school students in KSA

currently have only one session a week dedicated to PA, which does not align with the recommendations of the WHO for this age group to engage in regular PA.

Offering a variety of activities emerged as a key recommendation, with participants advocating for a broad selection of physical activities, including different sports, fitness classes, and recreational options to accommodate diverse tastes and abilities. This recommendation aligns with findings from previous studies (Casey et al., 2016; Martins et al., 2018). Furthermore, it was suggested that activities should be engaging and suitable for students' age and skill levels to prevent frustration or injury. Recognising that some students may prefer non-competitive activities while others may enjoy competitive ones, accommodating both preferences is essential. Furthermore, creating a supportive and enjoyable environment was also emphasized, aiming to establish an atmosphere where adolescents can have fun, interact with friends, and feel supported and encouraged. This approach promotes a sense of mastery and safety, fostering a positive PA experience for students (Martins et al., 2021; Laird et al., 2018; Garcia et al., 2016).

The third prominent suggestion preferred by some students at both schools was to have football sessions three times a week. Football was favoured because both schools already have facilities and spaces for the game, and its rules are relatively simple. This preference aligns with a previous study by Block et al. (2011), which noted that football is simpler to play and does not demand professional training compared to other sports such as basketball, swimming, and tennis.

The final sub-theme within the community level, “The Role of Local Educational Authorities”, underscores the importance of local educational authorities in implementing policies and programmes that promote PA in schools. Interviews revealed

that some participants at both schools emphasised the significance of enacting new policies to reshape PA programmes within educational institutions. Additionally, some participants, particularly parents, stressed the importance of providing more time for PA for children in this age group, highlighting the need for societal awareness to promote PA and urging cooperation from all members of society to encourage children to be more active.

Additionally, our analysis revealed that both schools do not allocate sufficient time for PA, as mentioned earlier, with just one weekly session lasting 45 minutes. Within this limited timeframe, the initial and final minutes are typically dedicated to preparation and transitioning, leaving inadequate time for students to engage in meaningful PA. Consequently, students are deprived of the broader benefits associated with regular PA. Research by Sardinha et al. (2016) suggested that insufficient time allocated for PA in schools may contribute to decreased levels of PF, limiting students' opportunities for improvement. Moreover, it has been shown that exercise requires adequate time for individuals to fully engage their bodies, and those with sufficient time tend to achieve better results than those under time constraints (Rhea, 2010; Block et al., 2011).

8.4 Implications for Policy and Practice

The findings of this research have several implications for policy and practice. Based on the comprehensive analysis, the following section integrates the Theory of Expanded, Extended, and Enhanced Opportunities (TEO) (Beets et al., 2016) into the recommendations for PA interventions for boys in KSA.

8.4.1 Elements for PA Intervention for Boys in KSA Using TEO

The TEO provides a practical and evidence-based framework for designing effective PA interventions. This framework was developed by Beets et al. (2016) in response to the

observed minimal effects of traditional PA interventions targeting youth, which often relied heavily on complex behavioural theories or SEM. Beets and colleagues proposed that the limited success of these interventions could be attributed to a misunderstanding or overlooking of fundamental mechanisms that drive changes in PA behaviours.

TEO Framework Development: The TEO framework emerged from a thorough review of existing youth PA interventions, where Beets et al. identified that many successful programmes shared common strategies focused on increasing opportunities for PA. These strategies were categorised into three core mechanisms:

Expanded Opportunities: Introducing new occasions for PA that did not previously exist. For example, adding PA breaks during the school day or creating new after-school sports programmes.

Extended Opportunities: Increasing the time allocated for existing PA opportunities, such as lengthening recess periods or scheduling more frequent PE classes.

Enhanced Opportunities: Improving the quality of existing PA opportunities by making them more engaging and effective, often through curriculum changes, teacher training, or better equipment.

Previous Applications of TEO: Beets and colleagues applied the TEO framework in various settings, such as schools and after-school programmes, to test its effectiveness. Empirical evidence from these applications demonstrated that interventions incorporating expanded, extended, and enhanced opportunities significantly increased the time youth spent in MVPA. For example, studies showed that adding after-school activity programmes or increasing PE class frequency led to measurable improvements in youth PA levels. These findings highlight the practical utility of the TEO framework

in creating more impactful PA interventions by focusing on the availability, duration, and quality of opportunities for youth to engage in PA.

Recent Applications of TEO: Several studies have further tested and validated the TEO framework across different contexts. Turn up the HEAT (Healthy Eating and Activity Time) Programme (2016-2019), this intervention was implemented in summer day camps and focused on expanding, extending, and enhancing PA opportunities for children. This study found that when these opportunities were systematically increased, there was a significant rise in children's MVPA, supporting the TEO framework's effectiveness in a camp setting (Weaver et al., 2017). Furthermore, ongoing cRCT in Switzerland is applying the TEO framework in Swiss secondary schools focusing on active school programme by extending PE periods, expanding opportunities for PA during school hours, and enhancing existing opportunities, the programme aims to sustainably increase students' PA over a period of 12 to 24 months (Gasser et al., 2024). In addition, interdisciplinary obesity prevention programme: This programme applied the TEO framework in interventions aimed at preventing childhood obesity by focusing on improving the quality of PA available to overweight and obese adolescents before expanding or extending these opportunities (Ten Hoor et al., 2017).

These studies underscore the relevance and adaptability of the TEO framework across various settings and populations. They provide strong evidence that interventions designed around the principles of TEO can effectively enhance PA levels among youth.

In the context of boys in KSA, the TEO framework can guide the development of tailored interventions that address the specific cultural and environmental factors influencing PA

behaviours. Below are the elements that should be included in a PA intervention for boys in KSA, aligned with the TEO framework:

Expanded Opportunities: To introduce new PA opportunities, it is essential to integrate short PA breaks into the school day. For instance, schools could include 5-10 minute ABs between classes to reduce sedentary time. Additionally, before and after school programmes should be established to provide further opportunities for PA outside of regular school hours. These could include sports clubs or activity sessions tailored to boys' interests, ensuring a variety of engaging options.

Extended Opportunities: Increasing the time allocated for existing PA is another crucial element. Lengthening the duration of recess and PE classes is a practical approach. Instead of having just one 45-minute session per week, schools could offer multiple sessions totalling 120 minutes or more per week. Scheduling more frequent PE classes throughout the week will help ensure regular PA, promoting sustained engagement among male students.

Enhanced Opportunities: Improving the quality of PA involves several strategies. First, the PE curriculum should be modified to include a wider variety of activities that are enjoyable and cater to different skill levels. Both competitive and non-competitive options should be incorporated to suit all students. Professional development for PE teachers is essential to improve the delivery of PA, making them more engaging and effective. Investing in high-quality sports equipment and maintaining facilities to ensure they are safe and appealing for PA is also critical.

8.5 Strengths and Limitations of this Research

In order to evaluate the extent to which wider implications may be drawn from the study, it is essential to identify strengths and weaknesses in both the design of the study as well as the reality of the research process.

8.5.1 Strengths

This research was strengthened by its emphasis on gathering perspectives from children, parents, and school staff members, which have been relatively underexplored in the context of public health, particularly in KSA. By including these diverse stakeholders, the study offers a better understanding of the factors influencing PA among school-aged children. Additionally, to the best of our knowledge, this is the first study conducted in Jeddah City, KSA, to explore the facilitators and barriers to PA among school children aged 13 to 15 years old using the SEM and qualitative methodologies. This approach sheds light on previously unexplored aspects of PA engagement within this population and geographical context.

Unlike some previous studies that have focused on specific aspects or groups (Al-Nuaim et al., 2023), this research offers a more comprehensive overview by including various groups of participants and triangulating their perspectives. By incorporating insights from children, parents, and school staff, the study provides a holistic understanding of the challenges and opportunities related to PA participation. Furthermore, the research was strengthened by the use of rigorous qualitative methods, including follow-up interviews to enhance the reliability and validity of the findings. By conducting follow-up interviews, the researcher ensured accurate interpretation and validation of the initial findings, thereby enhancing the credibility of the research findings.

8.5.2 Limitations

This research, like any other, has several limitations that should be acknowledged. Firstly, the focus solely on schoolboys stems from cultural barriers and norms within the KSA. Rigid cultural and religious norms regarding gender segregation hindered the inclusion of girls, limiting the generalisability of the findings to girls' schools and potentially overlooking differences in perspectives and experiences related to PA. Despite the introduction of PE classes to girls' schools in the KSA as recently as 2018, further research is needed to bridge the knowledge gap and provide insights into their PA behaviours and preferences. Also, given the study's focus on male students, the findings may not fully capture the experiences and challenges faced by female students. Cultural norms and expectations often differ for girls, particularly in the context of PA, and future research should aim to include female participants to provide a more comprehensive understanding of how gender influences PA engagement. Understanding these differences is crucial for developing inclusive PA interventions that cater to the needs of all students.

Secondly, the recruitment of participants from only two intermediate schools located in different socio-economic areas of Jeddah City constraints the findings' applicability to a broader population. Significant regional differences within KSA, as reported by Ahuja et al. (2014), suggest that a multi-site study exploring other geographical areas could provide a more comprehensive understanding of diverse populations' perspectives on PA.

Thirdly, the potential for recruitment bias exists, as participants who agreed to partake in the study might inherently possess a more favourable disposition towards PA. This study also faces the risk of social acceptability bias, particularly during the initial data

collection and follow-up interviews, where participants might provide responses they believe the interviewer wishes to hear or that they think would please the researcher.

Lastly, in terms of the impact of undertaking data collection and analysis in Arabic and presenting the results in English, there were challenges associated with translating Arabic expressions and idiomatic language into English. For example, a participant used the phrase *"Your hand fingers are not the same"* to express the diversity in student preferences for physical activities, which, though eloquent in Arabic, may lose some of its nuanced meaning in English translation. This limitation is critical, as linguistic nuances can significantly impact the interpretation and presentation of research findings, but the researcher minimised the impact of translation challenges by using quotation marks when some local phrases did not translate well. Furthermore, the researcher did the analysis in Arabic to preserve the core meaning. Reflecting on this, future research should consider the implications of language translation on the validity and reliability of data interpretation, especially in multicultural and multilingual research contexts.

8.6 Dissemination Strategy

A well-structured dissemination strategy is crucial to ensure that the findings of this research reach the appropriate audiences and can be effectively utilised to inform policy, practice, and further research. This strategy outlines the key methods and channels through which the findings will be shared with policymakers, researchers, schools, and participants.

For policymakers, the research findings will be summarised in concise, targeted policy briefs that highlight the key findings, implications, and recommendations. These briefs will be distributed to relevant government departments, such as the Ministry of Education and local governmental bodies responsible for public health

and education. Additionally, meetings and presentations with policymakers and key stakeholders will be organised to discuss the findings and explore potential policy implementations. Participation in or the establishment of advisory committees that include policymakers, educators, and public health officials will ensure that the research findings are considered in the development of new policies and programmes. For the meetings and presentations, the researcher plan to arrange meetings with key stakeholders within the Ministry of Education, including the Department of PE and Public Health officials. The researcher has already initiated contact with a senior policy advisor at the Ministry of Education, to schedule a presentation of the findings next semester. These presentations will take place at the Ministry of Education headquarters in Riyadh.

To reach researchers, the findings will be published in open access peer-reviewed journals focusing on public health, PA, and education. This will ensure the findings reach a broad academic audience and contribute to the existing body of knowledge. The researcher will be preparing manuscript for submission to journals such as *BMC Public Health*, *Journal of Physical Activity and Health*, and *Health Education Research*, *PLOS One*. These journals have a strong readership among researchers in the fields of public health and education, ensuring broad dissemination. Furthermore, the researcher will present the research either at national or international conferences, such as the Saudi International Conference on Health Promotion or the International Society for Physical Activity and Health (ISPAH) Congress. Moreover, the researcher plan to engage with research networks, such as the Arab Network for Research on Public Health, to disseminate the findings through their platforms.

For schools, workshops will be conducted for school staff and administrators to share the research findings and discuss practical strategies for implementing the recommended interventions. Educational materials, such as pamphlets, guides, and toolkits, will be developed to summarise the key findings and provide actionable recommendations for schools. These materials will be distributed to schools and made available online. Additionally, presentations and interactive sessions with students, teachers, and parents will be organised to share the findings and discuss the importance of PA, helping to raise awareness and encourage the adoption of healthier practices within the school community. The researcher has already contacted both schools' principals and these workshops will be scheduled in next semester in 2025.

Participants will be engaged through community meetings that will be hosted in the participating schools to present the findings and discuss their implications. This will provide an opportunity for participants to engage with the research outcomes and contribute to the discussion on how to improve PA in schools. Summary reports will be provided to participants, including students, parents, and school staff, detailing the research findings and how their input has contributed to the study, ensuring transparency and showing appreciation for their involvement. Online platforms, such as school websites and social media, will be utilised to disseminate the findings to a broader audience, ensuring that the information is accessible to participants and the wider community.

Finally, by employing these dissemination methods, the research findings will be effectively communicated to all relevant stakeholders, ensuring that the insights

gained from this study can be translated into meaningful actions and policies that promote PA among schoolboys.

8.7 What is the Original Contribution to Knowledge of this Thesis

This study contributes to the evidence-base and existing body of knowledge on PA in several significant ways, particularly within the context of Jeddah City, KSA. By focusing on schoolboys aged 13 to 15, this research fills a gap in our understanding of PA among adolescents in a region where public health studies, especially those addressing PA in the context of cultural and environmental factors, are relatively scarce. Below are the key contributions of this thesis:

- **Reviewing International and Local Evidence on School-based Interventions:** This thesis begins by examining the extensive literature about what was effective in school settings internationally and identifies several promising interventions that could increase PA levels among school-aged children. It then conducts another systematic review focusing on primary studies from Arabic-speaking countries and the Middle East to ascertain effective interventions within these regions as well.
- **In-depth Understanding of Barriers and Facilitators:** Through qualitative methodologies, this study uncovers the complex web of factors that encourage or hinder PA among the target population. It highlights the role of enjoyment, competition, and perceived health benefits as motivators, while also identifying significant barriers such as academic pressure, inadequate facilities, and extreme weather conditions. These findings contribute to a more nuanced understanding of how to promote PA effectively among youth in similar contexts.

- **Stakeholder Perspectives:** By incorporating views from school staff, parents, and students, this research provides a holistic perspective on PA. This inclusive approach ensures that the recommendations for enhancing PA are grounded in the real-world experiences and needs of those most closely involved, making the findings highly relevant for policy and practice.
- **Policy and Practice Implications:** This thesis offers some recommendations for both schools and policymakers. By suggesting the adaptation and evaluation of some international PA programmes, addressing disparities in resources, and advocating for increased PA within the school curriculum, this study serves as a blueprint for interventions aimed at improving adolescent health and wellbeing in KSA and potentially other regions with similar cultural and environmental contexts.
- **Foundation for Future Research:** Lastly, this research lays the groundwork for future studies in the field of PA among youth. It identifies areas needing further exploration, such as the inclusion of female students and the evaluation of intervention programmes tailored to KSA schools. This thesis, therefore, not only advances our current understanding but also charts a course for subsequent inquiries into PA promotion among adolescents.

In summary, this thesis makes a significant contribution by shedding light on the complexities of promoting PA among schoolboys in Jeddah, KSA. Its findings and recommendations have the potential to inform more culturally sensitive, effective public health strategies and interventions, thereby contributing to the global

endeavour of fostering healthier, more active youth populations. However, it also underscores the need for future studies to explore these dynamics among female students, which would provide a more balanced view and support the development of gender-sensitive PA interventions.

8.8 Recommendations

Based on the findings from the umbrella review in Chapter Three, the systematic review in Chapter Four, and this primary research, we have formulated recommendations for schools and policymakers:

8.8.1 Recommendations for schools:

Firstly, schools should offer a wide variety of PA options to cater to diverse student interests and abilities, ensuring there are activities that the majority find enjoyable and accessible, regardless of skill level or physical condition. Additionally, schools should integrate elements of healthy competition that motivate students, while also providing non-competitive PA options to ensure inclusivity for all students, including those who may be deterred by competitive environments. Furthermore, schools should empower students by allowing them to have a say in the types of physical activities included in the programme, thereby aligning with their interests and increasing motivation.

Also, schools should address barriers to participation in PA by creating flexible schedules that accommodate PA, offering support for students to overcome challenges such as lack of skills or fear of injury, and promoting a supportive environment that discourages peer bullying and works to reduce preference for sedentary activities like electronic gaming. Furthermore, incorporating education on PA, health, and fitness concepts into the curriculum to enhance students' understanding and knowledge,

avoiding oversimplified approaches and instead providing comprehensive and engaging content.

Secondly, the findings from the umbrella review (see Chapter Three) revealed the effectiveness of some international interventions, such as TDM programme, ABs, active desks, and multi-component interventions, in increasing children and adolescents' PA levels within schools. Some interventions also integrate PA with nutrition and education, showing promise in enhancing PA and reducing BMI (for programmes descriptions, see pages 9,10,11 and 12 in Chapter Two). These programmes have significantly improved PA and fitness levels, as well as participation in MVPA, helping in fulfilling the public health guidelines of 60 minutes of MVPA per day for children. Therefore, to tailor these interventions to the KSA context, specific aspects such as cultural preferences for types of physical activities, seasonal variations affecting outdoor activities, and integration with Islamic teachings and practices need to be carefully considered. This adaptation process requires a collaborative effort among policymakers, educators, health professionals, and researchers to adapt these programmes to the KSA context effectively. Subsequently, a comprehensive evaluation should be conducted to assess its impact accurately.

For the evaluation of these adapted interventions, it is recommended the implementation of pilot programmes in KSA schools utilising a c-RCT design. This approach allows for the assessment of the interventions' effectiveness while accounting for the natural grouping of students within schools. The evaluation should include both process and outcome measures. Process evaluation would examine the implementation fidelity, acceptability, and feasibility of the interventions, identifying any barriers or facilitators to their execution. Outcome evaluation, on the other hand, should measure the

interventions' impact on PA levels, fitness, participation in MVPA, and BMI among students. This comprehensive evaluation will provide valuable insights into the interventions' efficacy, inform future scalability, and contribute to the global body of evidence on promoting PA in schools.

Thirdly, it was evident that the public school included in this research is severely lacking in facilities, resources, and space in comparison to the private school, which poses a significant challenge in providing suitable PA opportunities for their students. The absence of these resources is a substantial barrier to students' participation in physical activities within the public school. Conversely, the availability of these resources is a key facilitator for students in the private school to engage in PA.

Given this disparity, we recommend that schools, especially those with limited resources, should prioritise the provision of adequate space and facilities to enable students to actively participate in PA. An agreement between schools lacking in space and facilities and local sports clubs could serve as a temporary solution and a viable option for implementing PA interventions. These clubs typically offer indoor facilities, making them less susceptible to adverse weather conditions, such as extreme heat in KSA.

8.8.2 Recommendations for Policymakers:

Firstly, our analysis of qualitative data has uncovered a consensus among some school staff members from both the public and the private schools, as well as parents, who have suggested the need for additional PA sessions within the school day. Currently, there is only one weekly session for PA, lasting 45 minutes, integrated into the school schedule. However, it's important to note that this allocated period of time is not completely devoted to PA. Usually, the initial five minutes are allocated for preparation, followed

by the division of students into teams and instructional briefings. Toward the end of the session, there are typically just five minutes remaining for students to change and return to their classrooms after the activity. Consequently, this limited time is insufficient to keep students physically active, and they are unable to fully experience the broader benefits of PA.

Therefore, we recommend that policymakers collaborate with school authorities to allocate more time for PA within the school day. This can be achieved by either dedicating additional time currently allocated to other subjects as suggested by some participants or by increasing the overall daily hours, as suggested by some participants as well.

Secondly, our analysis of qualitative data revealed that some parents prioritise academic achievements over PA for their children. It is crucial to inform parents about the significance of PA and the wide-ranging benefits of regular PA, aligning with the recommendations provided by the WHO for this age group. Moreover, parents should receive better education regarding the issues associated with physical inactivity to motivate their sons to engage in PA.

The government should take the initiative to develop and implement media campaigns aimed at enhancing parental awareness about the importance of PA and the consequences of inactivity as suggested by some school staff. Researchers, educators, and healthcare professionals should collaborate closely with KSA government policymakers to disseminate information within the community regarding the importance of PA and the health consequences of obesity.

Given the popularity of various social media platforms in KSA, such as TV, Snapchat, Twitter (now known as X), and TikTok, these platforms should be leveraged to promote

a better understanding of and deliver practical and positive messages regarding the significance of PA.

Thirdly, policymakers should extend their support to schools in terms of facilities and financial assistance. Collaboration with educators, health professionals, and researchers is essential to tailor interventions to the specific context and address the unique challenges faced by schools. Additionally, the allocation of resources is a critical component of effective policy implementation. Policymakers should recognise that successful school-based PA interventions may require additional resources, both in terms of human expertise and financial investment. This may encompass investments in teacher training, infrastructure development, and the adoption of evidence-based programmes. By strategically allocating resources, policymakers can enhance the feasibility and sustainability of interventions, ensuring that schools receive the necessary support to effectively implement and maintain PA programmes.

Furthermore, the integration of PA into the school curriculum, especially within PE lessons, provides a structured approach to promoting a healthy and active lifestyle. In KSA, the promotion of regular PA among children and young people stands as a crucial public health strategy aimed at combatting obesity.

8.9 Conclusion

This study set out to explore the challenges and opportunities for schools' PA among schoolboys aged 13 to 15 in Jeddah City, KSA, by engaging with school staff, parents, and the boys themselves. Our objective was to explore both the challenges and opportunities behind PA within this demographic. Through qualitative analysis, key factors identified that encourage or hinder PA, ranged from personal enjoyment and perceived benefits to environmental and logistical constraints.

This findings reveal that enjoyment, competition, and awareness of PA benefits significantly motivate students. However, challenges such as heavy academic schedules, limited access to suitable facilities, and extreme weather conditions pose significant barriers. These insights are in line with existing literature but also expand the understanding by focusing on the specific context such as the type of schools, age group and KSA setting.

A major strength of this research is its comprehensive approach, incorporating perspectives from a diverse group of stakeholders. This is the first study of it's kind to carry out a qualitative exploration of PA barriers and opportunities for programme development with schools staff, parents and students in two contrasting school in KSA in this age group. However, the study's focus on male students and limited age group from just two schools limits its broader generalisability. Future research should aim to include a wider range of participants to enhance generalisability and should aim to include female participants to develop a more holistic understanding of adolescent PA in KSA, ensuring that interventions are both effective and equitable.

Based on this research, both findings from the umbrella review presented in Chapter Three and the systematic review presented in Chapter Four, it is recommended to pilot and adapt successful international PA interventions to the KSA context, addressing resource disparities between schools, increasing PA time within the school curriculum, and improving parental awareness of PA's importance. These actions are vital for fostering an environment that supports and promotes PA among youth.

Looking ahead, there is a clear need for collaborative efforts to pilot, assess, and refine PA interventions tailored to local needs. Emphasising comprehensive benefits, ensuring

equal access to PA resources, and creating a supportive community environment are crucial steps toward nurturing a physically active youth population.

In summary, this study contributes valuable insights into promoting PA among school-aged boys in KSA. Addressing the identified challenges and opportunities for enhancing PA can lead to significant advancements in public health and well-being for this population.

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Appendices

Appendix 1. Excluded Studies with Reasons

1. Inappropriate target population (n=8)

- Manojlovic, M., Roklicer, R., Trivic, T., Milic, R., Maksimović, N., Tabakov, R., Sekulic, D., Bianco, A. and Drid, P., 2023. Effects of school-based physical activity interventions on physical fitness and cardiometabolic health in children and adolescents with disabilities: a systematic review. *Frontiers in Physiology*, 14, p.1180639.
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2. Being protocol studies (n=2)

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3. Being not school-based (n=5)

- Cassar, S., Salmon, J., Timperio, A., Naylor, P.J., Van Nassau, F., Contardo Ayala, A.M. and Koorts, H., 2019. Adoption, implementation and sustainability of school-based physical activity and sedentary behaviour interventions in real-world settings: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 16, pp.1-13.
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4. Measured different outcomes rather than PA (n=17)

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5. Did not adopt a systematic review approach (n=3)

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- Drouka, A., Brikou, D., Causeret, C., Al Ali Al Malla, N., Sibalo, S., Ávila, C., Alcat, G., Kapetanakou, A.E., Gurviez, P., Fellah-Dehiri, N. and Masson, M., 2023. Effectiveness of school-based interventions in Europe for promoting healthy lifestyle behaviors in children. *Children*, 10(10), p.1676.

Appendix 2. Quality assessment by AMSTAR version 2

#	Author, year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Evaluation final rate
1	Yuksel et al., 2020	X	X	X	Y	Y	Y	X	Y	Y	X	NA	NA	/	/	/	X	Critically low
2	Larouche et al., 2018	Y	/	X	Y	Y	Y	X	Y	Y	X	NA	NA	Y	/	NA	/	Critically low
3	Hanna et al., 2023	X	/	Y	/	X	X	X	Y	X	X	NA	NA	Y	Y	/	/	Critically low
4	Masini et al., 2020	Y	Y	Y	Y	Y	Y	X	Y	Y	X	Y	/	/	Y	Y	/	High
5	Moeini et al., 2021	Y	Y	Y	Y	Y	Y	X	Y	Y	X	Y	Y	Y	Y	Y	Y	High
6	Wong et al., 2021	Y	Y	Y	Y	X	X	X	Y	Y	X	/	/	Y	/	Y	X	Low
7	Vaquero-Solís et al., 2020	Y	X	X	/	/	/	X	X	Y	X	NA	NA	Y	/	NA	/	Critically low
8	Breslin et al., 2023	Y	Y	Y	Y	Y	X	Y	/	Y	X	NA	NA	/	/	NA	/	Low
9	Schönbach et al., 2020	Y	X	Y	Y	Y	Y	/	Y	Y	X	NA	NA	/	/	NA	/	Low
10	Buru et al., 2020	X	X	X	Y	Y	X	/	Y	Y	X	NA	NA	X	/	/	X	Critically low
11	Brandes et al., 2022	Y	/	Y	Y	/	/	Y	Y	X	X	NA	NA	X	X	X	/	Critically low
12	Owen et al., 2017	X	/	X	X	X	/	X	Y	/	X	/	/	/	/	/	/	Low
13	Chavez & Nam, 2020	X	X	X	X	X	X	/	/	Y	X	NA	NA	/	Y	NA	X	Critically low

14	Masini et al., 2022	Y	Y	Y	Y	Y	Y	/	Y	Y	X	NA	NA	/	/	/	/	High
15	Carrasco-Uribarren et al., 2023	X	Y	Y	Y	Y	/	/	Y	Y	X	Y	/	/	/	Y	/	High
16	Nally et al., 2021	X	Y	Y	Y	Y	Y	/	Y	Y	X	Y	Y	/	/	/	Y	High
17	Guirado et al., 2021	X	Y	Y	Y	Y	Y	/	Y	Y	X	NA	NA	Y	/	/	X	Moderate
18	Campos-Garzón et al., 2023	Y	Y	Y	Y	Y	/	/	Y	/	X	/	/	/	/	X	/	Moderate
19	Bermejo-Cantarero et al., 2023	X	/	Y	Y	Y	Y	/	Y	Y	X	Y	Y	/	/	X	X	Moderate
20	Pfledderer et al., 2021	Y	/	Y	/	Y	X	/	Y	X	X	/	/	X	Y	Y	X	Low
21	Ahmed et al., 2021	Y	/	Y	Y	Y	Y	Y	Y	Y	X	NA	NA	/	/	/	X	High
22	Neil-Sztramko et al., 2021	Y	Y	/	/	/	/	/	/	/	Y	NA	NA	Y	Y	X	/	High

Value of each item *

“Y” Yes	“X” No	“/” Partial yes	“NA” Not applicable

Items of AMSTAR 2 **

1. Did the research questions and inclusion criteria for the review include the components of PICO?
2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?
3. Did the review authors explain their selection of the study designs for inclusion in the review?
4. Did the review authors use a comprehensive literature search strategy?
5. Did the review authors perform study selection in duplicate?

6. *Did the review authors perform data extraction in duplicate?*
7. *Did the review authors provide a list of excluded studies and justify the exclusions?*
8. *Did the review authors describe the included studies in adequate detail?*
9. *Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?*
10. *Did the review authors report on the sources of funding for the studies included in the review?*
11. *If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?*
12. *If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?*
13. *Did the review authors account for the risk of bias in individual studies when interpreting/ discussing the results of the review?*
14. *Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?*
15. *If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?*
16. *Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?*

Evaluation of the final rate

<i>High</i>	<i>No or one non-critical weakness: the systematic review provides an accurate and comprehensive summary of the results of the available studies that address the question of interest.</i>
<i>Moderate</i>	<i>More than one non-critical weakness*: the systematic review has more than one weakness but no critical flaws. It may provide an accurate summary of the results of the available studies that were included in the review.</i>
<i>Low</i>	<i>One critical flaw with or without non-critical weaknesses: the review has a critical flaw and may not provide an accurate and comprehensive summary of the available studies that address the question of interest.</i>
<i>Critically low</i>	<i>More than one critical flaw with or without non-critical weaknesses: the review has more than one critical flaw and should not be relied on to provide an accurate and comprehensive summary of the available studies.</i>

Appendix 3. Studies were Excluded During Full-text Screening with Reasons

Not school-based intervention (14)

Abeer, A. S., Saniya, S., Mona, A. T., Buthiania, A. S., & Mariam, A. A. (2015). Interventional program for teenagers' obesity.

Aljuhani, O. and Sandercock, G., 2019. Contribution of physical education to the daily physical activity of schoolchildren in Saudi Arabia. *International journal of environmental research and public health*, 16(13), p.2397.

Alharbi, M., 2019. Influence of individual and family factors on physical activity among Saudi girls: a cross-sectional study. *Annals of Saudi medicine*, 39(1), pp.13-21.

Boodai, S. A., McColl, J. H., & Reilly, J. J. (2014). National Adolescent Treatment Trial for Obesity in Kuwait (NATTO): project design and results of a randomised controlled trial of a good practice approach to treatment of adolescent obesity in Kuwait. *Trials*, 15(1), 1-6.

Al-Thani, M., Al-Thani, A., Alyafei, S., Al-Kuwari, M.G., Al-Chetachi, W., Khalifa, S.E., Ibrahim, I., Sayegh, S., Vinodson, B. and Akram, H., 2018. Prevalence of physical activity and sedentary-related behaviors among adolescents: data from the Qatar National School Survey. *Public Health*, 160, pp.150-155.

Zimmo, L., Farooq, A., Almudahka, F., Ibrahim, I. and Al-Kuwari, M.G., 2017. School-time physical activity among Arab elementary school children in Qatar. *BMC pediatrics*, 17(1), pp.1-7.

Pengpid, S. and Peltzer, K., 2020. Trends in the prevalence of twenty health indicators among adolescents in United Arab Emirates: cross-sectional national school surveys from 2005, 2010 and 2016. *BMC pediatrics*, 20(1), pp.1-11.

Al-Domi, H.A., Faqih, A., Jaradat, Z., Anfal, A.D., Jaradat, S. and Amarneh, B., 2019. Physical activity, sedentary behaviors and dietary patterns as risk factors of obesity among Jordanian schoolchildren. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 13(1), pp.189-194.

Al Husaini, A. (2017). Physical Activity and Sedentary Behavior Relative to Body Mass Index among School Children in Saudi Arabia. *Pediatr Ther*, 7(312), 2161-0665.

Althumiri, N. A., BinDhim, N. F., & Alqahtani, S. A. (2020). Prevalence of physical inactivity and sedentary behaviors and associations with obesity among Saudi Adults. *J Health Econ Outcomes Res*.

Al Eid, A. J., Alahmed, Z. A., Al-Omary, S. A., & Alharbi, S. M. (2017). RASHAKA Program: A collaborative initiative between Ministry of Health and Ministry of Education to control childhood obesity in Saudi Arabia. *Saudi Journal of Obesity*, 5(1), 22.

Alnasser, A., Kyle, J., Aloumi, N., Al-Khalifa, A., & Marais, D. (2019). The Twazon Arabic Weight Loss App: App-Based Intervention for Saudi Women With Obesity. *JMIR mHealth and uHealth*, 7(5), e10923.

Alturki, H. A., Brookes, D. S., & Davies, P. S. (2018). Obesity prevention interventions in Saudi Arabian children—building the evidence base: An in-depth analysis of sociodemographic characteristics and dietary habits of obese and normal weight schoolchildren. *Glob Epidemic Obes*, 6.

Al-Hazzaa, H. M. (2007). Pedometer-determined physical activity among obese and non-obese 8-to 12-year-old Saudi schoolboys. *Journal of physiological anthropology*, 26(4), 459-465.

Having an inappropriate target population (2)

Nemet, D., Geva, D., Pantanowitz, M., Igbaria, N., Meckel, Y., & Eliakim, A. (2013). Long term effects of a health promotion intervention in low socioeconomic Arab-Israeli kindergartens. *BMC pediatrics*, 13(1), 1-7.

Kaufman-Shriqui, V., Fraser, D., Friger, M., Geva, D., Bilenko, N., Vardi, H., ... & Shahar, D. R. (2016). Effect of a school-based intervention on nutritional knowledge and habits of low-socioeconomic school children in Israel: a cluster-randomized controlled trial. *Nutrients*, 8(4), 234.

Studies focusing only on obese and overweight students (5)

Haghani, S., Shahnazi, H., & Hassanzadeh, A. (2017). Effects of tailored health education program on overweight elementary school students' obesity-related lifestyle: A school-based interventional study. *Oman medical journal*, 32(2), 140.

Hassan, N. E. M., Zaki, S. T., El-masry, S., Mohsen, M. A., & Elashmawy, E. (2011). Impact of Balanced Caloric Diet and Physical activity on Body Composition and Fat Distribution of Obese Egyptian Adolescent Girls. *Maced J Med Sci*, 4(1), 17-24.

Amini, M., Djazayeri, A., Majdzadeh, R., Taghdisi, M. H., Sadrzadeh-Yeganeh, H., Abdollahi, Z., ... & Nourmohammadi, M. (2016). A school-based intervention to reduce excess weight in overweight and obese primary school students. *Biological research for nursing*, 18(5), 531-540.

Bagherniya, M., Darani, F. M., Sharma, M., Maracy, M. R., Birgani, R. A., Ranjbar, G., ... & Keshavarz, S. A. (2018). Assessment of the efficacy of physical activity level and lifestyle behavior interventions applying social cognitive theory for overweight and obese girl adolescents. *Journal of research in health sciences*, 18(2), 409.

Aljassim, H. and Jradi, H., 2021. Childhood overweight and obesity among the Saudi population: a case-control study among school children. *Journal of Health, Population and Nutrition*, 40(1), pp.1-9.

Inappropriate study type = 7

Habib-Mourad, C., & Ghandour, L. A. (2015). Time to act: lessons learnt from the first pilot school-based intervention study from Lebanon to prevent and reduce childhood obesity. *Frontiers in public health*, 3, 56.

Al-Haifi, A. R., Al-Fayez, M. A., Al-Nashi, B., Al-Athari, B. I., Bawadi, H., & Musaiger, A. O. (2012). Right Diet: a television series to combat obesity among adolescents in Kuwait. *Diabetes, metabolic syndrome and obesity: targets and therapy*, 5, 205.

Musaiger, A. O., Al Hazzaa, H. M., Al-Qahtani, A., Elati, J., Ramadan, J., AboulElla, N. A., ... & Kilani, H. A. (2011). Strategy to combat obesity and to promote physical activity in Arab countries. *Diabetes, metabolic syndrome and obesity: targets and therapy*, 4, 89.

Bajamal, E., Robbins, L.B., Ling, J., Smith, B., Pfeiffer, K.A. and Sharma, D., 2017. Physical activity among female adolescents in Jeddah, Saudi Arabia: A health promotion model-based path analysis. *Nursing research*, 66(6), pp.473-482.

Baniissa, W., Radwan, H., Rossiter, R., Fakhry, R., Al-Yateem, N., Al-Shujairi, A., ... & Awad, M. A. (2020). Prevalence and determinants of overweight/obesity among school-aged adolescents in the United Arab Emirates: a cross-sectional study of private and public schools. *BMJ open*, 10(12), e038667.

Aperman-Itzhak, T., Yom-Tov, A., Vered, Z., Waysberg, R., Livne, I., & Eilat-Adar, S. (2018). School-Based intervention to promote a healthy lifestyle and obesity prevention among fifth-and sixth-grade children. *American Journal of Health Education*, 49(5), 289-295.

Benajiba, N., Mahrous, L., Janah, K., Alqabbani, S. F., Chavarria, E. A., & Aboul-Enein, B. H. (2020). Physical activity interventions promoted in the Arabic-speaking region: a review of the current literature. *Obesity Reviews*, 21(8), e13032.

Appendix 4. Risk Assessment CASP Tool for RCTs.

Items	Taymoori & Lubans (2008)	El Ansari et al. (2010)	Saffari et al. (2013)	Habib-Mourad et al. (2014)	Darabi et al. (2017)	Rostami-Moez et al. (2017)	Simbar et al. (2017)	Stanley et al. (2017)	Habib-Mourad et al. (2020)	Habib-Mourad et al. (2020a)	Allafi 2020	Bahathig & Saad (2022)	Kutbi et al., 2019
Item 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Item 2	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Item 3	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Item 4	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
Item 5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Item 6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Item 7	Primary outcome was clearly specified – p -value ($< .05$)	Primary outcome was clearly specified – p -value ($< .05$)	Primary outcome was clearly specified – p -value ($< .001$)	Primary outcome was clearly specified – p -value ($< .001$)	Primary outcome was clearly specified – p -value ($< .001$)	Primary outcome was clearly specified – p -value ($< .01$)	Primary outcome was clearly specified – p -value ($< .05$)	Primary outcome was clearly specified – p -value ($< .05$)	Primary outcome was clearly specified – p -value ($< .01$)	Primary outcome was clearly specified – p -value ($< .05$)	Primary outcome was clearly specified – p -value (< 0.05)	Primary outcome was clearly specified (p > 0.05)	Primary outcome was clearly specified – p -value ($< .05$)
Item 8	Yes – 95% Confidence limit applied	Yes – 95% Confidence limit applied / correlation coefficient was .97%	Yes – 95% Confidence limit applied	Yes – 95% Confidence limit applied	Yes – 95% Confidence limit applied	Yes – 95% Confidence limit applied / correlation coefficient was .86%	Yes – 95% Confidence limit applied	Yes – 95% Confidence limit applied	Yes – 95% Confidence limit applied	Yes – 95% Confidence limit applied	Yes – 95% Confidence limit applied	Yes – 95% Confidence limit applied	Yes – 95% Confidence limit applied
Item 9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Item 10	Yes	Yes	Unclear – the	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes
Item 11	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note:

Item 1: Did the trial address a clearly focused issue? **Item 2:** Was the assignment of patients to treatments randomised? **Item 3:** Were all of the patients who entered the trial properly accounted for at its conclusion? **Item 4:** Were patients, health workers and study personnel ‘blind’ to treatment? **Item 5:** Were the groups similar at the start of the trial? **Item 6:** Aside from the experimental intervention, were the groups treated equally? **Item 7:** How large was the treatment effect? **Item 8:** How precise was the estimate of the treatment effect? **Item 9:** Can the results be applied to the local population, or in your context? **Item 10:** Were all clinically important outcomes considered? **Item 11:** Are the benefits worth the harms and costs?

Appendix 5. JBI Quasi-Experimental Studies Tool

Item / Study	Maatoug et al. (2013)	Maatoug et al. (2015)	Ghamman et al. (2017)	Elfaki et al., 2020
1) Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	Yes	Yes	Yes	Yes
2) Were the participants included in any comparisons similar?	Yes	Yes	Yes	Yes
3) Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Yes	Yes	Yes	Yes
4) Was there a control group?	Yes	Yes	Yes	Yes
5) Were there multiple measurements of the outcome both pre and post the intervention/exposure?	Yes	Unclear	Yes	Yes
6) Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	Yes	Unclear	Yes	Unclear
7) Were the outcomes of participants included in any comparisons measured in the same way?	Unclear	Unclear	Unclear	Unclear
8) Were outcomes measured in a reliable way?	Yes	Yes	Yes	Yes
9) Was appropriate statistical analysis used?	Yes	Yes	Yes	Yes

Appendix 6. Ethical Approval from the University of Sheffield



Downloaded: 11/08/2022
Approved: 19/04/2022

Abdullah Alalawi
Registration number: 200281607
School of Health and Related Research
Programme: PhD/Health & Related Res FT

Dear Abdullah

PROJECT TITLE: Exploring the Challenges and Opportunities Involved in Increasing Physical Activity Among Children and Young People in Saudi Arabian Schools

APPLICATION: Reference Number 043510

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 19/04/2022 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 043510 (form submission date: 07/04/2022); (expected project end date: 31/07/2022).
- Participant information sheet 1102950 version 3 (07/04/2022).
- Participant information sheet 1102951 version 3 (07/04/2022).
- Participant information sheet 1102952 version 4 (07/04/2022).
- Participant consent form 1102955 version 3 (01/04/2022).
- Participant consent form 1102954 version 2 (31/03/2022).
- Participant consent form 1102953 version 3 (31/03/2022).

If during the course of the project you need to [deviate significantly from the above-approved documentation](#) please inform me since written approval will be required.

Your responsibilities in delivering this research project are set out at the end of this letter.

Yours sincerely

Devianee Keetharuth
Ethics Administrator
School of Health and Related Research

Please note the following responsibilities of the researcher in delivering the research project:

- The project must abide by the University's Research Ethics Policy: <https://www.sheffield.ac.uk/rs/ethicsandintegrity/ethicspolicy/approval-procedure>
- The project must abide by the University's Good Research & Innovation Practices Policy: https://www.sheffield.ac.uk/polopoly_fs/1.671066!/file/GRIPPolicy.pdf
- The researcher must inform their supervisor (in the case of a student) or Ethics Administrator (in the case of a member of staff) of any significant changes to the project or the approved documentation.
- The researcher must comply with the requirements of the law and relevant guidelines relating to security and confidentiality of personal data.
- The researcher is responsible for effectively managing the data collected both during and after the end of the project in line with best practice, and any relevant legislative, regulatory or contractual requirements.

Appendix 7. Approval from the Saudi Ministry of Education

Translation, Interpretation and Education Services (Tieservices Ltd.)

Our Business Partner
Chartered Institute of Linguists



Date: 07/03/2022

Certificate of Authentic Translation

I, AHMED SAID, declare that, to the best of my knowledge and ability, this is a true and accurate translation of the Arabic document attached.

Translator's signature



Chartered Linguist number CIOL 51604

Mobile: 07553755641



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Certified Translation from Arabic

Kingdom of Saudi Arabia
Ministry of Education
(280)

Ref No.: 96/1/3D
Date: 09/07/1443 Hijri
corresponding to 11/02/2022
Attachment: _____

The General Directorate of Education in Jeddah
Department of Planning and Information - Researches and Studies

Our version: A Student, is educated, proud of his religion, belongs to his homeland, producer of knowledge, a global competitor

Confirmation of the Application of the Research

Name	: ABDULLAH OMAR Y. ALALAWI	Civil Registry No.	: 1068098506
Mobile No.	: 0553200184	Email	: aalawi@uqu.edu.sa
The research is supervised by	: The Scholarship Services Centre at the Ministry of Education		Speciality : Public Health
Degree	: PhD	The study sample	: Students' Guardians, School Staff Members and Students at Intermediate Schools
Study Title	: Exploring the Challenges and Opportunities Involved in Increasing Physical Activity Among Children and Young People in Saudi Arabian Schools.		
The topic	: Confirmation of the Application of the Research		

To Whom It May Concern

Peace, mercy and blessings of God be upon you.

Based on the statement of the General Counsellor and Supervisor of the Scholarship Services Centre in the Ministry of Education that the researcher (whose particulars are mentioned above) is a student studying outside the Kingdom, and in response to his desire to provide you with approval to apply his research tools and collect data related to the study sample.

We inform you that we have no objection to the approval after studying the research tool: this is to encourage scientific research for the benefit of the homeland with such field research: we are thankful and appreciative for your cooperation and interest.

Peace, mercy and blessings of God be upon you.

Director of Planning and Information at Directorate of Education in Jeddah
Signature of Khalil Ben Faraj Al-Wafi

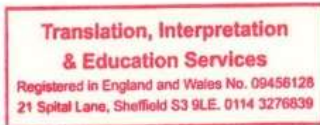
Telephone No.: 6444305 – Fax No.: 6434040 Postcode: 21158

DECLARATION

I, AHMED SAID, declare that **this is a true and accurate translation of the Arabic document attached**, to the best of my knowledge and ability.

Date of Translation: 07/03/2022

Mobile No: 07553755641



Translator's signature: _____

Chartered Linguist number CIOL 51604



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www.tieservices.co.uk | info@tieservices.co.uk | Tel: 0114 327 6839

Ahmed
07/03/2022

Translation, Interpretation
& Education Services
Registered in England and Wales No. 09456128
21 Spital Lane, Sheffield S3 9LE. 0114 3276639

الرقم : ٢٢/١/٩٦
التاريخ : ١٤٤٢/٧/٩
المرفقات :



وزارة التعليم
Ministry of Education

المملكة العربية السعودية
وزارة التعليم
(٢٨٠)
الإدارة العامة للتعليم بمحافظة جدة
إدارة التخطيط والمعلومات - البحوث والدراسات

رؤيتنا : متعلم .. معترف بدينه .. منتم لوطنه .. منتج للمعرفة .. منافس عالمياً .

إفادة بتطبيق البحث

الاسم	عبدالله عمر يحيى العلوي	السجل المدني	١٠٦٨٠٩٨٥٠٦
الجوال	٠٥٥٣٢٠٠١٨٤	البريد الإلكتروني	aalawi@uqu.edu.sa
الجهة المشرفة على البحث	مركز خدمات الابتعاث بوزارة التعليم	التخصص	الصحة العامة
الدرجة العلمية	دكتوراه	عينة الدراسة	أولياء أمور الطلاب و مديري ومعلمي وطلاب مرحلة المتوسطة
عنوان الدراسة	إستكشاف التحديات والفرص لزيادة النشاط البدني بين الأطفال والشباب في مدارس المملكة العربية السعودية		
الموضوع بشأن	إفادة بتطبيق البحث		

إلى : من يهيمه الأمر .

السلام عليكم ورحمة الله وبركاته

بناء على إفادة المستشار والمشرف العام على مركز خدمات الابتعاث بوزارة التعليم بأن الباحث (الموضح بياناته أعلاه) أحد الطلبة الدارسين خارج المملكة ، واستجابة لرغبته في تزويدكم بالموافقة بتطبيق أدوات بحثه و جمع البيانات المتعلقة بعينة الدراسة .
نفيدكم أنه لا مانع لدينا بالموافقة بعد دراسة أداة البحث : و ذلك تشجيعاً للبحث العلمي وبما يعود على الوطن يمثل هذه البحوث الميدانية : شاكرين ومقدرين تعاونكم واهتمامكم.
والسلام عليكم ورحمة الله وبركاته

مدير إدارة التخطيط والمعلومات بتعليم جدة

خليل بن فراج الوافي

هاتف ٦٤٤٤٣٠٥ - فاكس ٦٤٣٤٠٤٠ - الرمز البريدي : ٢١١٥٨

Appendix 8. Information Sheets and Consent Forms for School Staff



Information Sheet for Interviews

Title of the research: Exploring the Challenges and Opportunities Involved in Increasing Physical Activity Among Children and Young People in Saudi Arabian Schools.

You are being invited to take part in the above research study. To help you decide whether you would like to take part or not, it is important that you understand why the research is being done and what it will involve. Please read the information below carefully and ask any question if anything is not clear or you would like more information before you decide to take part in this research. You may want to discuss it with others, but it is up to you to decide whether or not to take part. If you are happy to participate, you will be asked to sign a consent form.

About the researcher & research:

I am Abdullah Alalawi who is a PhD student in School of Health and Related Research, at the University of Sheffield, United Kingdom under supervision of Prof Elizabeth Goyder and Dr Lindsay Blank. The purpose of this research is to explore the barriers and enablers to increase physical activity among schools' children aged between 13 to 15 years old in Jeddah city, Saudi Arabia. I am conducting interviews with you to understand your perspective on the barriers and enablers of school-based physical activity among schools' students aged 13 to 15 years in your school.

As a student from Saudi Arabia who received a scholarship funded by the Saudi Arabia government, the researcher hopes to explore the opportunities and challenges of school-based physical activity among school student aged 13 to 15 years.

My PhD supervisors contact details:

Main Supervisor Prof Elizabeth Goyder

Email: e.goyder@sheffield.ac.uk

Second Supervisor Dr Lindsay Blank

Email: L.Blank@sheffield.ac.uk

1. Why have I been invited?

You have been chosen because your experience and views are very important in understanding what might, or might not, be appropriate to encourage students to be more active. We are interested in discussing your experiences regarding this issue.

2. Do I have to take part?

It is up to you to decide whether or not to take part. If you decide to take part, you will be given this information sheet to keep (and be asked to give consent for your data to be used) and you can still withdraw at any time without providing any reason. If you wish to withdraw, please contact Abdullah Alalawi: aalalawi1@sheffield.ac.uk

3. What will happen to me if I take part?

You will be invited to participate in semi-structured interview via one-to-one or online or by phone. The interview will be quite informal. In addition. The interview is estimated to take between 30-45 minutes.

4. What do I have to do?

If you are interested to take part in the interview, please contact the researcher through: aosalawil@sheffield.ac.uk OR 00966553200184. Then, you will be invited to conduct an interview, which will be scheduled at a mutually convenient time.

5. Will the interview be recorded?

Yes, will be recorded by a digital recorder. In addition, I will transcribe and analyse the interview later. It will be kept strictly confidential, and the audio records will be stored securely. You will not be identifiable in any reports.

6. What are the possible disadvantages and risks of taking part?

There are no significant risks for you to part taking in this interview and you can withdraw at any time. If you do not wish to carry on the interview for any reason, the interview will be discontinued. If you are distressed by the interview, I will offer advice on where to seek help.

7. What are the possible benefits of taking part?

There would be no personal benefits to you if you decided to take part in this research. However, you have the opportunity to see the findings at the end of this study.

8. Will my taking part in this study be kept confidential?

Yes. All information that will be collected/ recorded about you during the research will be kept strictly confidential. All documents related to the study (e.g., consent form) will be kept securely as scanned electronic files on a secure university drive. The documents will be destroyed five years after the end of the study. Anonymised quotations will be used in the thesis and journal articles, but you will not be identified in any reports or publications.

9. What will happen if I don't want to carry on with the study?

You are free to withdraw from the interview at any time.

10. What will happen to the results of the research study?

The data will be analysed by the researcher, with support from my PhD supervisors: Prof Elizabeth Goyder (the main supervisor) and Dr Lindsay Blank (the second supervisor), reports of the results will include quotes from the discussion, but the participants will not be identifiable from the quotes. The study results will publish as a thesis and in peer-reviewed journals and presented at relevant conferences. The research findings will also be used to inform future research.

11. Who is organising and funding the research?

The organisation is the University of Sheffield and this research funded by the Saudi Arabia government.

12. Who has ethically reviewed this study?

This study has been ethically reviewed and approved by the ethics committee at the University of Sheffield and the Ministry of Education in Saudi Arabia.

13. Contact for further information

For further information about this research, including anything you wish to know before deciding whether to take part or not, please contact:

Mr Abdullah Alalawi who is a PhD student at the University of Sheffield.

Email: aalalawi1@sheffield.ac.uk OR call number:00966553200184.

14. I wish to complain about the research

If you want to complain about the research, feel free to contact the researcher: Abdullah Alalawi on email: aalalawi1@sheffield.ac.uk Or call 00966553200184

If you wish to raise a complaint, please contact the main supervisor on email: e.goyder@sheffield.ac.uk . if the complaint relates to how the participants' personal data has been handled, they can contact The University of Sheffield Data Protection Officer, Luke Thompson – dataprotection@sheffield.ac.uk . Further information about how to raise a complaint can be found in the University's Privacy Notice: <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>.

Finally, I would like to thank you for you choosing to participate and please keep a copy of this information sheet and thank you for choosing to participate in this study.

عنوان البحث: استكشاف التحديات والفرص لزيادة النشاط البدني بين الأطفال والشباب في مدارس المملكة العربية السعودية.

أنت مدعو للمشاركة في الدراسة البحثية المذكورة أعلاه. لمساعدتك في تحديد ما إذا كنت ترغب في المشاركة أم لا، من المهم أن تفهم سبب إجراء البحث وما الذي سيضمنه. يرجى قراءة المعلومات الواردة أدناه بعناية وطرح أي أسئلة إذا كان أي شيء غير واضح أو إذا كنت ترغب في مزيد من المعلومات قبل أن تقرر المشاركة في هذا البحث. قد ترغب في مناقشته الأمر مع الآخرين، ولكن الأمر متروك لك لتقرر ما إذا كنت ستشارك أم لا. إذا كنت سعيدًا بالمشاركة، فيُطلب منك التوقيع على نموذج موافقة.

عن الباحث والبحث:

أنا عبد الله العلوي، طالب دكتوراه في كلية الصحة والبحوث ذات الصلة، في جامعة شيفلد بالمملكة المتحدة تحت إشراف البروفيسور إليزابيث جويدر والدكتورة لينسي بلانك. الغرض من هذا البحث هو استكشاف العوائق والعوامل المساعدة لزيادة النشاط البدني بين أطفال المدارس الذين تتراوح أعمارهم بين 13 و15 عامًا في مدينة جدة بالمملكة العربية السعودية. سأجري المقابلة معك لفهم وجهة نظرك حول العوائق والعوامل التمكينية للنشاط البدني المدرسي بين طلاب المدارس الذين تتراوح أعمارهم بين 13 و15 عامًا في مدرستك.

كطالب من المملكة العربية السعودية حصل على منحة دراسية ممولة من حكومة المملكة العربية السعودية، يأمل الباحث في استكشاف فرص وتحديات النشاط البدني المدرسي بين طلاب المدارس الذين تتراوح أعمارهم بين 13 و15 عامًا.

تفاصيل الاتصال بمشرفي الدكتوراه:

المشرف الرئيسي البروفيسور إليزابيث جويدر

الایمیل: e.goyder@sheffield.ac.uk

المشرف التالي: الدكتورة لينسي بلانك

الایمیل: L.Blank@sheffield.ac.uk

1. لماذا تمت دعوتي للمشاركة؟

لقد تم اختيارك لأن تجربتك ورأيك مهمة جدًا في فهم ما قد يكون أو لا يكون مناسبًا لتشجيع الطلاب على أن يكونوا أكثر نشاطًا. نحن مهتمون بمناقشة تجاربك فيما يتعلق بهذه المسألة.

2. هل يجب عليه المشاركة؟

الأمر متروك لك لتقرر ما إذا كنت ستشارك أم لا. إذا قررت المشاركة، فسيتم إعطاؤك ورقة المعلومات هذه للاحتفاظ بها (وسيطلب منك الموافقة على استخدام بياناتك) ولا يزال بإمكانك الانسحاب في أي وقت دون إبداء أي سبب. إذا كنت ترغب في الانسحاب، يرجى التواصل مع عبد الله العلوي: aoalawi1@sheffield.ac.uk

3. **ماذا سيحدث لي إذا شاركت؟**
ستتم دعوتك للمشاركة في المقابلة عبر مقابلة فردية أو عبر الإنترنت أو عبر الهاتف. ستكون المقابلة غير رسمية إلى حد ما. بالإضافة إلى من المحتمل أن تستغرق المقابلة ما بين 30-45 دقيقة.
4. **ماذا علي أن أفعل؟**
إذا كنت مهتمًا بالمشاركة في المقابلة، فيرجى الاتصال بالباحث من خلال: aalalawi1@sheffield.ac.uk أو الإتصال 00966553200184. بعد ذلك، ستتم دعوتك لإجراء المقابلة، والتي سيتم تحديد موعدها في الوقت المناسب للطرفين.
5. **هل سيتم تسجيل المقابلة؟**
نعم سيتم تسجيلها بواسطة جهاز تسجيل رقمي. بالإضافة إلى ذلك، ستقوم بتدوين المقابلة وتحليلها لاحقًا. سيتم الاحتفاظ بها في سرية تامة، وسيتم تخزين التسجيلات الصوتية بشكل آمن. لن يتم التعرف عليك في أي تقارير.
6. **ماهي العيوب المحتملة والمخاطر للمشاركة؟**
لا توجد مخاطر كبيرة بالنسبة لك للمشاركة في هذه المقابلة ويمكنك الانسحاب في أي وقت. إذا كنت لا ترغب في إجراء المقابلة لأي سبب من الأسباب، فسيتم إيقاف المقابلة. إذا شعرت بالضيق بسبب المقابلة، فسأقدم لك النصيحة بشأن مكان طلب المساعدة.
7. **ماهي الفوائد المحتملة للمشاركة؟**
لن تكون هناك فوائد شخصية لك إذا قررت المشاركة في هذا البحث. ومع ذلك، لديك الفرصة لرؤية النتائج في نهاية هذه الدراسة.
8. **هل ستيقي مشاركتي في هذه الدراسة سرية؟**
نعم. سيتم الاحتفاظ بجميع المعلومات التي سيتم جمعها / تسجيلها عنك أثناء البحث بسرية تامة. سيتم الاحتفاظ بجميع المستندات المتعلقة بالدراسة (على سبيل المثال، نموذج الموافقة) بشكل آمن كملفات إلكترونية ممسوحة ضوئيًا على محرك جامعي آمن. سيتم إتلاف الوثائق بعد خمس سنوات من انتهاء الدراسة. سيتم استخدام الاقتباسات مجهولة المصدر في الأطروحة ومقالات المجلات، ولكن لن يتم تحديد هويتك في أي تقارير أو منشورات.
9. **ماذا سيحدث إذا لم أرغب في مواصلة الدراسة؟**
أنت حر في الانسحاب من المقابلة في أي وقت.
10. **ماذا سيحدث لنتائج الدراسة البحثية؟**
سيتم تحليل البيانات من قبل الباحث وبدعم من مشرفي الدكتوراه: البروفيسور إليزابيث جويدر (المشرف الرئيسي) والدكتور لينسي بلانك (المشرف الثاني)، وستتضمن تقارير النتائج اقتباسات من المناقشة، لكن المشاركين لن يتم التعرف عليها من الاقتباسات. ستنتشر نتائج الدراسة كأطروحة وفي المجلات المحكمة ويتم تقديمها في المؤتمرات ذات الصلة. سيتم استخدام نتائج البحث أيضًا لإبلاغ البحث المستقبلي.
11. **من يقوم بتنظيم وتمويل البحث؟**
المنظمة هي جامعة شيفلد وهذا البحث ممول من حكومة المملكة العربية السعودية.
12. **من قام بمراجعة هذه الدراسة أخلاقياً؟**
تمت مراجعة هذه الدراسة بشكل أخلاقي والموافقة عليها من قبل لجنة الأخلاقيات في جامعة شيفلد ووزارة التعليم في المملكة العربية السعودية.
13. **للاتصال للحصول على مزيد من المعلومات:**
مزيد من المعلومات حول هذا البحث، بما في ذلك أي شيء ترغب في معرفته قبل اتخاذ قرار بالمشاركة أم لا، يرجى الاتصال بـ: الأستاذ عبد الله العلوي طالب دكتوراه بجامعة شيفلد.
البريد الإلكتروني: aalalawi1@sheffield.ac.uk أو رقم الاتصال: 00966553200184.

14. أرغب في تقديم شكوى حول البحث؟

إذا كنت ترغب في تقديم شكوى بشأن البحث فلا تتردد في الاتصال بالباحث: عبد الله الحلوي على البريد الإلكتروني: aalalawil@sheffield.ac.uk أو الاتصال على 00966553200184
إذا كنت ترغب في تصعيد الشكوى، فيرجى الاتصال بالمشرّف الرئيسي على البريد الإلكتروني: egoyder@sheffield.ac.uk
إذا كانت الشكوى تتعلق بكيفية التعامل مع البيانات الشخصية للمشاركين، فيمكنهم الاتصال بمسؤول حماية البيانات بجامعة شفيلد، لوك طومسون dataprotection@sheffield.ac.uk يمكن العثور على مزيد من المعلومات حول كيفية تقديم شكوى في إشعار الخصوصية بالجامعة:
<https://www.sheffield.ac.uk/govern/data-protection/privacy/general>

أخيرًا، أود أن أشكرك على اختيارك المشاركة ويرجى الاحتفاظ بنسخة من ورقة المعلومات هذه وشكرًا لك على اختيارك المشاركة في هذه الدراسة.



Consent Form for Interviews Participants

Title of the research: Exploring the Challenges and Opportunities Involved in Increasing Physical Activity Among Children and Young People in Saudi Arabian Schools.

<i>Please tick the boxes</i>	Yes
Taking Part in the Project	
I have read and understood the project information sheet, or the project has been fully explained to me.	☐
I have been given the opportunity to ask questions about the project.	☐
I agree to take part in the project. I understand that taking part in the project will include interview and the interview will be recorded by using a digital audio recorder and notes will be taken by the researcher.	☐
I understand that by choosing to participate as a volunteer in this research, this does not create a legally binding agreement nor is it intended to create an employment relationship with the University of Sheffield.	☐
I understand that my taking part is voluntary and that I can withdraw from the interview at any time, and I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw from the interview.	☐
How my information will be used during and after the project	
I understand my personal details such as name, phone number, address and email address etc. will not be revealed to people outside the project.	☐
I understand and agree that my words may be quoted in publications, reports, web pages, and other research outputs. I understand that I will not be named in these outputs.	☐
I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form.	☐
I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐
I give permission for the information I have provided during this interview, to be deposited in The University of Sheffield so it can be used for future research and learning	☐
So that the information you provide can be used legally by the researchers	
I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield.	☐

Name of participant [printed]

Signature

Date

Name of Researcher [printed]

Signature

Date

Project contact details for further information:

The researcher: Abdullah Omar Alalawi PhD student at the University of Sheffield

Email: aoalalawi1@sheffield.ac.uk

Address: School of Health and Related Research, 30 Regent Street, Sheffield S1 4DA

Once completed, one copy for the participant and one (original) for the researcher.

استمارة موافقة المشاركين في المقابلة

عنوان البحث: إستكشاف التحديات والفرص لزيادة النشاط البدني بين الأطفال والشباب في مدارس المملكة العربية السعودية.

نعم	يرجى وضع علامة في المربع
	المشاركة في المشروع
☐	لقد قرأت وفهمت ورقة معلومات المشروع، أو تم شرح المشروع بالكامل لي.
☐	لقد أتيت لي الفرصة لطرح أسئلة حول المشروع.
☐	أوافق على المشاركة في المشروع. أفهم أن المشاركة في المشروع ستشمل مقابلة وسيتم تسجيل المقابلة باستخدام مسجل صوت رقمي وسيتم تدوين الملاحظات من قبل الباحث.
☐	أفهم أنه باختيار المشاركة كمطوع في هذا البحث، فإن هذا لا ينشئ اتفاقية ملزمة قانوناً ولا يهدف إلى إنشاء علاقة عمل مع جامعة شيفيلد.
☐	أفهم أن مشاركتي تطوعية وأنه يمكنني الانسحاب من المقابلة في أي وقت، وأست مضطراً لإبداء أي أسباب لعدم رغبتني في المشاركة ولن تكون هناك عواقب سلبية إذا اخترت الانسحاب من المقابلة.
	كيف سيتم استخدام معلوماتي أثناء وبعد المشروع
☐	أفهم أن بياناتي الشخصية مثل الاسم ورقم الهاتف والعنوان وعنوان البريد الإلكتروني وما إلى ذلك لن يتم الكشف عنها للأشخاص خارج المشروع.
☐	أفهم وأوافق على أنه يمكن اقتباس كلماتي في النشر والتقارير وصفحات الإنترنت ومخرجات البحث الأخرى. أفهم أنه لن يتم ذكر اسمي في هذه المخرجات.
☐	أفهم وأوافق على أن الباحثين المعتمدين الآخرين لن يتمكنوا من الوصول إلى هذه البيانات إلا إذا وافقوا على الحفاظ على سرية المعلومات كما هو مطلوب في هذا النموذج.
☐	أفهم وأوافق على أنه يجوز للباحثين المعتمدين الآخرين استخدام بياناتي في النشر والتقارير وصفحات الإنترنت ومخرجات البحث الأخرى، فقط إذا وافقوا على الحفاظ على سرية المعلومات على النحو المطلوب في هذا النموذج.
☐	أعطي الإذن بالمعلومات التي قدمتها خلال هذه المقابلة، ليتم إيداعها في جامعة شيفيلد حتى يمكن استخدامها للبحث والتعلم في المستقبل.
	يمكن استخدام المعلومات التي تقدمها بشكل قانوني من قبل الباحثين
☐	أوافق على التنازل عن حقوق النشر التي أمتلكها في أي مواد تم إنشاؤها كجزء من هذا المشروع إلى جامعة شيفيلد.

اسم المشارك (المطبوع): _____ التوقيع: _____ التاريخ: _____

اسم الباحث (المطبوع): _____ التوقيع: _____ التاريخ: _____

تفاصيل الاتصال بالمشروع لمزيد من المعلومات:

اسم الباحث: عبد الله صبر يحيى العلوي، طالب دكتوراه بجامعة شيفيلد.

الإيميل: aosalaw1@sheffield.ac.uk

العنوان: كلية الصحة والبحوث ذات الصلة 30 شارع ريجنت، شيفيلد S1 4DA

بمجرد الانتهاء نسخة واحدة للمستقبل ك نسخة (أصلية) للباحث.

Appendix 9. Information Sheets and Consent Forms for Students



Information Sheet for Students

Title of the research: Exploring the Challenges and Opportunities Involved in Increasing Physical Activity Among Children and Young People in Saudi Arabian Schools

You are being invited to take part in the above research study. To help you decide whether you would like to take part or not, it is important that you understand why the research is being done and what it will involve. Please read the information below carefully and ask any question if anything is not clear or you would like more information before you decide to take part in this research. You may want to discuss it with others, but it is up to you to decide whether or not to take part. If you are happy to participate, you will be asked to sign a consent form.

About the researcher & research:

I am Abdullah Alalawi who is a PhD student in School of Health and Related Research, at the University of Sheffield, United Kingdom under supervision of Prof Elizabeth Goyder and Dr Lindsay Blank. The purpose of this research is to explore the challenges and opportunities to increase physical activity among schools' children aged between 13 to 15 years old in Jeddah city, Saudi Arabia. I am conducting workshops with school students to understand your perspective on the needs and requirements of school-based physical activity among schools' students aged 13 to 15 years in your school.

As a student from Saudi Arabia who received a scholarship funded by the Saudi Arabia government, the researcher hopes to explore barriers and enablers of physical activity among school student aged 13 to 15 years.

My PhD supervisors contact details:

Main Supervisor Prof Elizabeth Goyder

Email: e.goyder@sheffield.ac.uk

Second Supervisor Dr Lindsay Blank

Email: L.Blank@sheffield.ac.uk

1. Why have I been invited?

You have been chosen because your views are very important in understanding what might, or might not be appropriate to encourage students to be more active. We are interested in discussing your views regarding this issue.

2. Do I have to take part?

It is up to you to decide whether or not to take part. If you decide to take part, you will be given this information sheet to keep (and be asked to give consent for your data to be used) and you can still withdraw at any time from the workshops without providing any reason. If you wish to withdraw, please contact Abdullah Alalawi:

aalalawi1@sheffield.ac.uk

3. What will happen to me if I take part?

You will be invited to participate in workshops. The workshop will be quite informal and in a private room in the school. In addition, the discussion is estimated to take between 30-45 minutes.

4. What do I have to do?

If you are interested to take part in the workshops, please contact the researcher through: aosalawil@sheffield.ac.uk OR 00966553200184. Then, you will be invited to a workshop which will be scheduled at a mutually convenient time.

5. Will the discussion be recorded?

Yes, will be recorded by a digital recorder and I will transcribe and analyse the discussion later. It will be kept strictly confidential, and the audio records will be stored securely. You will not be identifiable in any reports.

6. What are the possible disadvantages and risks of taking part?

There are no significant risks for you to part taking this discussion and you can withdraw at any time. If you do not wish to carry on the discussion for any reason, the discussion will be discontinued. If you are distressed by the discussion, you will be able to speak to research assistance outside the room.

7. What are the possible benefits of taking part?

There would be no personal benefits to you if you decided to take part in this research. However, you have the opportunity to see the findings from the study at the end of this research.

8. Will my taking part in this study be kept confidential?

Yes. All information that will be collected/ recorded about you during the research will be kept strictly confidential. All documents related to the study (e.g., consent form) will be kept securely as scanned electronic files on a secure university drive. The documents will be destroyed five years after the end of the study. Anonymised quotations will be used in the thesis and journal articles, but you will not be identified in any reports or publications.

9. What will happen if I don't want to carry on with the workshops?

You are free to withdraw from the workshops at any time.

10. What will happen to the results of the research study?

The data will be analysed by the researcher, with support from my PhD supervisors: Prof Elizabeth Goyder (the main supervisor) and Dr Lindsay Blank (the second supervisor), reports of the results will include quotes from the discussion, but the participants will not be identifiable from the quotes. The study results will publish as a thesis and in peer-reviewed journals and presented at relevant conferences. The research findings will also be used to inform future research.

11. Who is organising and funding the research?

The organisation is the University of Sheffield and this research funded by the Saudi Arabia government.

12. Who has ethically reviewed this study?

This study has been ethically reviewed and approved by the ethics committee at the University of Sheffield and the Ministry of Education in Saudi Arabia.

13. Contact for further information

For further information about this research, including anything you wish to know before deciding whether to take part or not, please contact:

Mr Abdullah Alalawi who is a PhD student at the University of Sheffield.

Email: aalalawi1@sheffield.ac.uk OR call number: 00966553200184.

14. I wish to complain about the research

If you want to complain about the research, feel free to contact the researcher: Abdullah Alalawi on email: aalalawi1@sheffield.ac.uk Or call 00966553200184

If you wish to raise a complaint, please contact the main supervisor on email: e.goyder@sheffield.ac.uk . If the complaint relates to how the participants' personal data has been handled, they can contact The University of Sheffield Data Protection Officer, Luke Thompson – dataprotection@sheffield.ac.uk . Further information about how to raise a complaint can be found in the University's Privacy Notice: <https://www.sheffield.ac.uk/govern/data-protection/privacy/general>.

Finally, I would like to thank you for you choosing to participate and please keep a copy of this information sheet and thank you for choosing to participate in this study.



Consent Form for Students

Title of the research: Exploring the Challenges and Opportunities Involved in Increasing Physical Activity Among Children and Young People in Saudi Arabian Schools.

<i>Please tick the box</i>	Yes
Taking Part in the Project	
I have read and understood the project information sheet, or the project has been fully explained to me by the researcher.	☐
I have been given the opportunity to ask questions about the project.	☐
I agree to take part in the project. I understand that taking part in the project will include group of discussion and the discussion will be recorded by using a digital audio recorder and notes will be taken by the researcher	☐
I understand that by choosing to participate as a volunteer in this research, this does not create a legally binding agreement nor is it intended to create an employment relationship with the University of Sheffield.	☐
I understand that my taking part is voluntary and that I can withdraw from the workshops at any time, and I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw from workshops.	☐
How my information will be used during and after the project	
I understand my personal details such as name, phone number, address and email address etc. will not be revealed to people outside the project.	☐
I understand and agree that my words may be quoted in publications, reports, web pages, and other research outputs. I understand that I will not be named in these outputs.	☐
I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form.	☐
I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐
I give permission for the information I have provided during this workshop, that I provide to be deposited in The University of Sheffield so it can be used for future research and learning	☐
So that the information you provide can be used legally by the researchers	
I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield.	☐

Name of participant [printed]

Signature

Date

Name of Researcher [printed]

Signature

Date

Project contact details for further information:

The researcher: Abdullah Omar Alalawi PhD student at University of Sheffield

Email: aoalalawi1@sheffield.ac.uk

Address: School of Health and Related Research, 30 Regent Street, Sheffield S1 4DA

Once completed, one copy for the participant and one (original) for the researcher.

استمارة موافقة للطلاب

عنوان البحث: إستكشاف التحديات والفرص لزيادة النشاط البدني بين الأطفال والشباب في مدارس المملكة العربية السعودية.

نعم	يرجى وضع علامة في المربع
	المشاركة في المشروع
☐	لقد قرأت وفهمت ورقة معلومات المشروع، أو تم شرح المشروع بالكامل لي من قبل الباحث.
☐	لقد أُتيحت لي الفرصة لطرح أسئلة حول المشروع.
☐	أوافق على المشاركة في المشروع. أفهم أن المشاركة في المشروع ستشمل مشاركة في ورش عمل وسيتم تسجيل المناقشة باستخدام مسجل صوت رقمي وسيتم تدوين الملاحظات من قبل الباحث.
☐	أفهم أنه باختيار المشاركة كمستطوع في هذا البحث، فإن هذا لا ينشئ اتفاقية ملزمة قانوناً ولا يهدف إلى إنشاء علاقة عمل مع جامعة شيفيلد.
☐	أفهم أن مشاركتي تطوعية وأنه يمكنني الانسحاب من ورش العمل في أي وقت، ولست مضطراً لإبداء أي أسباب لعدم رغبتني في المشاركة ولن تكون هناك عواقب سلبية إذا اخترت الانسحاب من ورش العمل.
	كيف سيتم استخدام معلوماتي أثناء وبعد المشروع
☐	أفهم أن بياناتي الشخصية مثل الاسم ورقم الهاتف والعنوان وعنوان البريد الإلكتروني وما إلى ذلك لن يتم الكشف عنها للأشخاص خارج المشروع.
☐	أفهم وأوافق على أنه يمكن اقتباس كلماتي في النشر والتقارير وصفحات الإنترنت ومخرجات البحث الأخرى. أفهم أنه لن يتم ذكر اسمي في هذه المخرجات.
☐	أفهم وأوافق على أن الباحثين المعتمدين الآخرين لن يتمكنوا من الوصول إلى هذه البيانات إلا إذا وافقوا على الحفاظ على سرية المعلومات كما هو مطلوب في هذا النموذج.
☐	أفهم وأوافق على أنه يجوز للباحثين المعتمدين الآخرين استخدام بياناتي في النشر والتقارير وصفحات الإنترنت ومخرجات البحث الأخرى، فقط إذا وافقوا على الحفاظ على سرية المعلومات على النحو المطلوب في هذا النموذج.
☐	أعطي إذنًا بما قدمته من معلومات خلال هذه ورشه العمل، والذي قدمته ليتم إيداعه في جامعة شيفيلد حتى يمكن استخدامه للبحث والتعلم في المستقبل.
	يمكن استخدام المعلومات التي تقدمها بشكل قانوني من قبل الباحثين
☐	أوافق على التنازل عن حقوق النشر التي أمتلكها في أي مواد تم إنشاؤها كجزء من هذا المشروع إلى جامعة شيفيلد.

اسم المشارك (المطبوع): _____ التوقيع: _____ التاريخ: _____

اسم الباحث (المطبوع): _____ التوقيع: _____ التاريخ: _____

تفاصيل الاتصال بالمشروع لمزيد من المعلومات:

اسم الباحث: عبد الله صبر يحيى العلوي، طالب دكتوراه بجامعة شيفيلد.

الإيميل: aalalawi1@sheffield.ac.uk

العنوان: كلية الصحة والبحوث ذات الصلة، 30 شارع ريجنت، شيفيلد S1 4DA

بمجرد الانتهاء نسخة واحدة للمشاركة ونسخة (أصلية) للباحث.

Appendix 10. Consent Forms for Parents to Include their Children



Consent Form for Parents to agree for their child to participate

Title of the research: Exploring the Challenges and Opportunities Involved in Increasing Physical Activity Among Children and Young People in Saudi Arabian Schools.

<i>Please tick the box</i>	Yes
Taking Part in the Project	
I have read and understood the project information sheet, or the project has been fully explained to me.	☐
I have been given the opportunity to ask questions about the project.	☐
I agree to let my son to take part in the project. I understand that letting him take part in the project will include group of discussion and the workshops will be recorded by using a digital audio recorder and notes will be taken by the researcher	☐
I understand that by choosing to let my son to participate as a volunteer in this research, this does not create a legally binding agreement nor is it intended to create an employment relationship with the University of Sheffield.	☐
I understand that my son taking part is voluntary and that he can withdraw from the workshops at any time, and he does not have to give any reasons for why he no longer wants to take part and there will be no adverse consequences if he chooses to withdraw from workshops.	☐
How his information will be used during and after the project	
I understand his personal details such as name, phone number, address and email address etc. will not be revealed to people outside the project.	☐
I understand and agree that my son words may be quoted in publications, reports, web pages, and other research outputs. I understand that he will not be named in these outputs.	☐
I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form.	☐
I understand and agree that other authorised researchers may use his data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐
I give permission for the information that my son has provided during this study, that he provides to be deposited in The University of Sheffield so it can be used for future research and learning	☐
So that the information you provide can be used legally by the researchers	
I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield.	☐

Name of participant [printed]

Signature

Date

Name of Researcher [printed]

Signature

Date

Project contact details for further information:

The researcher: Abdullah Omar Alalawi PhD student at University of Sheffield

Email: aalalawi1@sheffield.ac.uk

Address: School of Health and Related Research, 30 Regent Street, Sheffield S1 4DA

Once completed, one copy for the participant and one (original) for the researcher.

استمارة موافقة أولياء الأمور للسماح لأبنائهم بالمشاركة

عنوان البحث: استكشاف التحديات والفرص لزيادة النشاط البدني بين الأطفال والشباب في مدارس المملكة العربية السعودية.

نعم	يرجى وضع علامة في المربع
	المشاركة في المشروع
☐	لقد قرأت وفهمت ورقة معلومات المشروع، أو تم شرح المشروع بالكامل لي.
☐	لقد أُتيحت لي الفرصة لطرح أسئلة حول المشروع.
☐	أوافق على السماح لابني بالمشاركة في المشروع. أفهم أن السماح له بالمشاركة في المشروع سيضمن مجموعة نقاش وسيتم تسجيل ورش العمل باستخدام مسجل صوت رقمي وسيتم تدوين الملاحظات من قبل الباحث.
☐	أفهم أنه باختيار السماح لابني بالمشاركة كمطوع في هذا البحث، فإن هذا لا ينشئ اتفاقية ملزمة قانونًا ولا يهدف إلى إنشاء علاقة عمل مع جامعة شيفيلد.
☐	أدرك أن مشاركة ابني تطوعية وأنه يمكنه الانسحاب من ورش العمل في أي وقت، ولا يتعين عليه إبداء أي أسباب لعدم رغبته في المشاركة ولن تكون هناك عواقب سلبية إذا اختار ذلك أن ينسحب من ورش العمل.
	كيف سيتم استخدام معلوماته أثناء وبعد المشروع
☐	أفهم أن بياناته الشخصية مثل الاسم ورقم الهاتف والعنوان وعنوان البريد الإلكتروني وما إلى ذلك لن يتم الكشف عنها للأشخاص خارج المشروع.
☐	أفهم وأوافق على أنه يمكن اقتباس كلمات ابني في النشر والتقارير وصفحات الإنترنت ومخرجات البحث الأخرى. أفهم أنه لن يتم ذكر اسمه في هذه المخرجات.
☐	أفهم وأوافق على أن الباحثين المعتمدين الآخرين لن يتمكنوا من الوصول إلى هذه البيانات إلا إذا وافقوا على الحفاظ على سرية المعلومات كما هو مطلوب في هذا النموذج.
☐	أفهم وأوافق على أنه يجوز للباحثين المعتمدين الآخرين استخدام بياناته في النشر والتقارير وصفحات الإنترنت ومخرجات البحث الأخرى، فقط إذا وافقوا على الحفاظ على سرية المعلومات على النحو المطلوب في هذا النموذج.
☐	أعطي الإذن بالمعلومات التي قدمها ابني خلال ورش العمل، والتي قدمها ليتم إيداعها في جامعة شيفيلد حتى يمكن استخدامها للبحث والتعلم في المستقبل.
	يمكن استخدام المعلومات التي تقدمها بشكل قانوني من قبل الباحثين
☐	أوافق على التنازل عن حقوق النشر التي أمتلكها في أي مواد تم إنشاؤها كجزء من هذا المشروع إلى جامعة شيفيلد.

اسم المشارك (المطبوع): _____ التوقيع: _____ التاريخ: _____

اسم الباحث (المطبوع): _____ التوقيع: _____ التاريخ: _____

تفاصيل الاتصال بالمشروع لمزيد من المعلومات:

اسم الباحث: عبد الله عمر يحيى الطوي، طالب دكتوراه بجامعة شيفيلد.

الإيميل: aoalalawi1@sheffield.ac.uk

العنوان: كلية الصحة والبحوث ذات الصلة، 30 شارع ريجنت، شيفيلد S1 4DA

بمجرد الانتهاء نسخة واحدة للمشارك ونسخة (أصلية) للباحث.

Appendix 11. Invitation Letter and Summary of Key Findings

Invitation letter

Dear Invitee,

You are being invited to take part in the research study titled “Exploring the Challenges and Opportunities Involved in Increasing Physical Activity Among Children and Young People in Saudi Arabian School”. To help you decide whether you would like to take part or not, it is important that you understand why the research is being done and what it will involve. Please read the information sheet attached carefully and ask any questions if anything is unclear or if you would like more information before deciding to participate in this research. You may want to discuss it with others, but it is up to you to decide whether or not to take part. If you are happy to participate, you will be asked to sign a consent form.

I am Abdullah Alalawi, a PhD student in the School of Health and Related Research, at the University of Sheffield, United Kingdom under the supervision of Prof Elizabeth Goyder and Dr Lindsay Blank. The purpose of this research is to explore the barriers and enablers to increase physical activity among schools’ children aged between 13 to 15 years old in Jeddah City, Saudi Arabia. I am conducting interviews with you to understand your perspective on the initial findings related to barriers and enablers of school-based physical activity among schools’ students aged 13 to 15 years in your school.

As a student from Saudi Arabia who received a scholarship funded by the Saudi Arabian government, the researcher hopes to explore the opportunities and challenges of school-based physical activity among school students aged 13 to 15 years.

You have been invited because your experience and views are very important in understanding what might, or might not, be appropriate to encourage students to be more active. We are interested in discussing your experiences regarding this issue. If you are happy to participate you will be invited to participate in a semi-structured interview online or by phone. The interview will be quite informal. In addition. The interview is estimated to take between 30-45 minutes.

If you have any questions about the study, then please do contact me. My phone number is 00966553200184 and I will be happy to discuss with you any questions you may have.

Thank you

Sincerely,

Abdullah Alalawi, PhD Student, University of Sheffield

خطاب دعوة

عزيزي المدعو،

أنت مدعو للمشاركة في الدراسة البحثية بعنوان "استكشاف التحديات والفرص التي تتطوي عليها زيادة النشاط البدني بين الأطفال والشباب في مدرسة المملكة العربية السعودية". لمساعدتك في تحديد ما إذا كنت ترغب في المشاركة أم لا، من المهم أن تفهم سبب إجراء البحث وما الذي سيتضمنه. يرجى قراءة ورقة المعلومات المرفقة بعناية وطرح أي أسئلة إذا كان هناك أي شيء غير واضح أو إذا كنت ترغب في الحصول على مزيد من المعلومات قبل أن تقرر المشاركة في هذا البحث. قد ترغب في مناقشة الأمر مع الآخرين، ولكن الأمر متروك لك لتقرر ما إذا كنت ستشارك أم لا. إذا كنت سعيدًا بالمشاركة، سيُطلب منك التوقيع على نموذج الموافقة

أنا عبد الله العلوي، طالب دكتوراه في كلية الصحة والبحوث ذات الصلة بجامعة سيفيلد بالمملكة المتحدة تحت إشراف البروفيسور إليزابيث جويدر والدكتورة ليندساي بلانك. الغرض من هذا البحث هو استكشاف المعوقات والممكنات لزيادة النشاط البدني بين أطفال المدارس الذين تتراوح أعمارهم بين 13 إلى 15 سنة في مدينة جدة، المملكة العربية السعودية. أقوم بإجراء مقابلات معك لفهم وجهة نظرك بشأن النتائج الأولية المتعلقة بالحواجز وعوامل تمكين النشاط البدني المدرسي بين طلاب المدارس الذين تتراوح أعمارهم بين 13 إلى 15 عامًا في مدرستك

كطالب من المملكة العربية السعودية حصل على منحة دراسية ممولة من حكومة المملكة العربية السعودية، يأمل الباحث في استكشاف فرص وتحديات النشاط البدني المدرسي بين طلاب المدارس الذين تتراوح أعمارهم بين 13 إلى 15 عامًا

لقد تمت دعوتك لأن خبرتك ووجهات نظرك مهمة جدًا في فهم ما قد يكون أو لا يكون مناسبًا لتشجيع الطلاب على أن يكونوا أكثر نشاطًا. نحن مهتمون بمناقشة تجاربك فيما يتعلق بهذه القضية. إذا كنت سعيدًا بالمشاركة، فستتم دعوتك للمشاركة في مقابلة شبه منظمة عبر الإنترنت أو عبر الهاتف. ستكون المقابلة غير رسمية تمامًا. فضلًا عن ذلك، من المتوقع أن تستغرق المقابلة ما بين 30-45 دقيقة

إذا كان لديك أي أسئلة حول الدراسة، يرجى الاتصال بي. رقم هاتفي هو 00966553200184 وسأكون سعيدًا بمناقشة أي أسئلة قد تكون لديكم

شكرًا لك

بإخلاص،

عبد الله العلوي، طالب دكتوراه، جامعة سيفيلد

Summary of the Initial Findings

Things that Make Physical Activity Easier	Things that Make Exercise Harder
1. Desire to do physical activity: Many students want to do it because it's fun and breaks the daily routine. 2. Co-participation and Competition: doing physical activities with others and competing can make it more enjoyable and motivating. 3. Choice and Autonomy: Being able to choose the type of physical activity they like and having some control over it can encourage students. 4. Faith Motivation: Some participants are motivated by their Islamic faith and beliefs 5. Enjoyment and Benefits: Many participants mentioned both enjoyment and academic, health, psychological and physical benefits. 6. Support from Others: Encouragement, rewards, and support from family, friends, peers, and teachers encourage PA participation. 7. Having access to facilities, diverse activities, and air-conditioned playgrounds can encourage physical activity.	1. Not feeling skilled: Some students don't feel confident in their physical abilities. 2. Not finding interest: Some students don't find physical activities interesting; they might not want to do them. 3. Being overweight: can make physical activity more challenging. 4. Bullying and Peer Pressure: Negative experiences like bullying or pressure from peers can discourage students' physical activity. 5. Preferring Electronic Games: Many students enjoy video games more than physical activities. 6. Feeling lazy or worried about getting hurt: Some students mentioned they feel lazy or worried about getting hurt when they exercise. 7. Too much schoolwork: Heavy schoolwork, exams, and homework can leave little time for physical activity. 8. Competing Uses of Time: Spending time on screens and electronic games can take away from physical activity. 9. Lack of Support from Others: When students don't get support from their family, friends, or teachers, it can be hard to stay active. Also, not enough time for physical activity in schools, and the number of students in a class can be a problem. Also, not having enough qualified physical education teachers and not having money or equipment were barriers.

Types of activities that students proposed:

Types of activities	Private school		Public school	
Different activities three times a week	✓		✓	
Walking programme	✓		✓	✓
Football three times a week	✓	✓	✓	
Jogging programme	✓			
Weightlifting programme	✓			

Types of activities that were proposed by teachers and parents:

Educational programme

Step-counting programme

Evening programme (open day)

ملخص النتائج

الأشياء التي تجعل ممارسة الرياضة أكثر صعوبة	الأشياء التي تجعل النشاط البدني أسهل
عدم الشعور بالمهارة: لا يشعر بعض الأشخاص بالثقة في قدراتهم البدني عدم العثور على الاهتمام: بعض الطلاب لا يجدون الأنشطة البدنية مثيرة للاهتمام؛ قد لا يريدون القيام بها زيادة الوزن: يمكن أن تجعل النشاط البدني أكثر صعوبة التنمر وضغط الأقران: يمكن للتجارب السلبية مثل التنمر أو الضغط من الأقران أن تثبط النشاط البدني للطلاب تفضيل الألعاب الإلكترونية: يستمتع العديد من الطلاب بألعاب الفيديو أكثر من الأنشطة البدنية الشعور بالكسل أو القلق بشأن التعرض للأذى: في بعض الأحيان، يشعر الأشخاص بالكسل أو القلق بشأن التعرض للأذى عند ممارسة التمارين الرياضية كثرة الواجبات المدرسية: يمكن أن تترك الواجبات المدرسية الثقيلة والامتحانات والواجبات المنزلية القليل من الوقت لممارسة النشاط البدني الاستخدامات المتنافسة للوقت: قضاء الوقت على الشاشات والألعاب الإلكترونية يمكن أن يبتعد عن النشاط البدني نقص الدعم من الآخرين: عندما لا يحصل الطلاب على الدعم من أسرهم أو أصدقائهم أو معلمهم، قد يكون من الصعب البقاء نشطين. كما أن عدم وجود وقت كافٍ لممارسة النشاط البدني في المدارس، وعدد الطلاب في الفصل يمكن أن يمثل مشكلة. كما أن عدم وجود عدد كافٍ من معلمي التربية البدنية المؤهلين وعدم توفر المال أو المعدات يمكن أن يشكل عائقًا	الرغبة في ممارسة النشاط البدني: يرغب الكثير من الطلاب في القيام به لأنه ممتع ويكسر الروتين اليومي المشاركة والمنافسة: القيام بالأنشطة البدنية مع الآخرين والتنافس يمكن أن يجعلها أكثر متعة وتحفيزًا الاختيار والاستقلالية: إن القدرة على اختيار نوع النشاط البدني الذي يفضلونه والحصول على بعض التحكم فيه يمكن أن يشجع الطلاب الدافع الإيماني: يتم تحفيز بعض المشاركين من خلال عقيدتهم ومعتقداتهم الإسلامية (الشعور بالتحفيز هو المعتقدات) الاستمتاع والفوائد: النشاط البدني لا يعطي شعورًا جيدًا فحسب، بل له أيضًا فوائد للصحة البدنية والعقلية والأكاديميين الدعم من الآخرين يمكن للتشجيع والمكافآت والدعم من العائلة والأصدقاء والأقران والمعلمين أن يحدث فرقًا كبيرًا في مشاركة السلطة الفلسطينية إن الوصول إلى المرافق والأنشطة المتنوعة والملاعب المكيفة يمكن أن يشجع النشاط البدني

أنواع الأنشطة التي يقترحها الطلاب

أنواع الأنشطة		مدرسة خاصة	مدرسة عامة
أنشطة مختلفة ثلاث مرات في الأسبوع		✓	✓
برنامج المشي			✓
كرة القدم ثلاث مرات في الأسبوع		✓	✓
برنامج الركض		✓	
برنامج رفع الأثقال		✓	

أنواع الأنشطة التي يقترحها المعلمون وأولياء الأمور

برنامج تعليمي
 برنامج عد الخطوات
 البرنامج المسائي (اليوم المفتوح)